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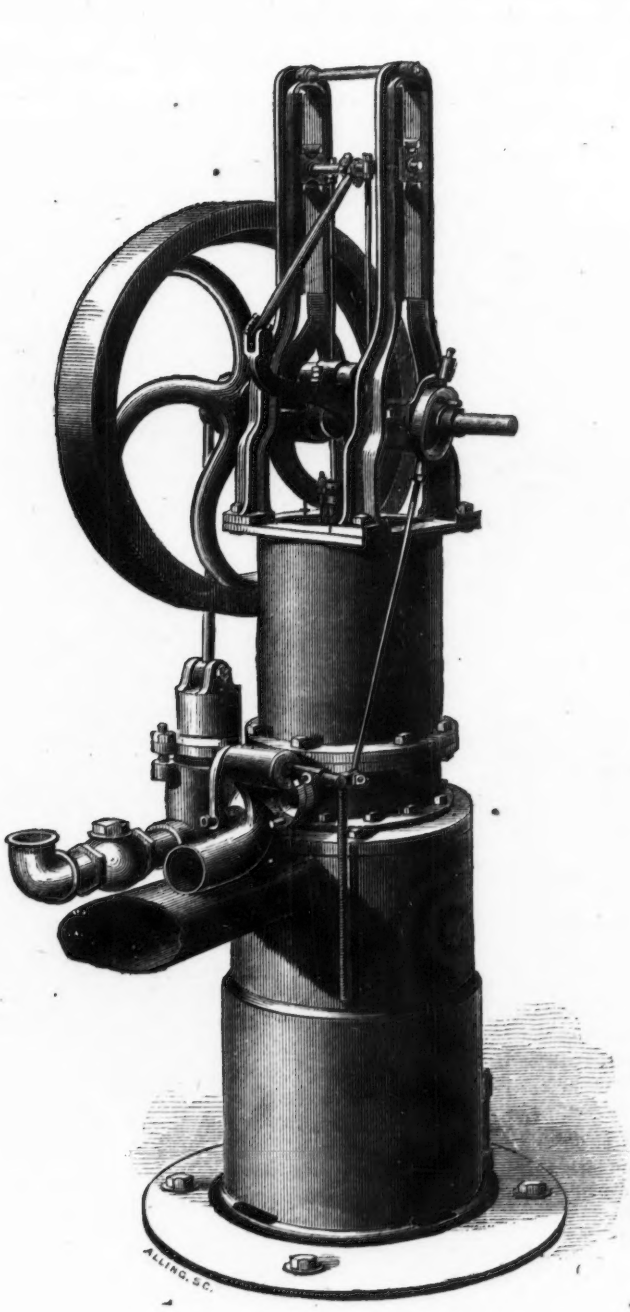
The Rider Caloric Engine.

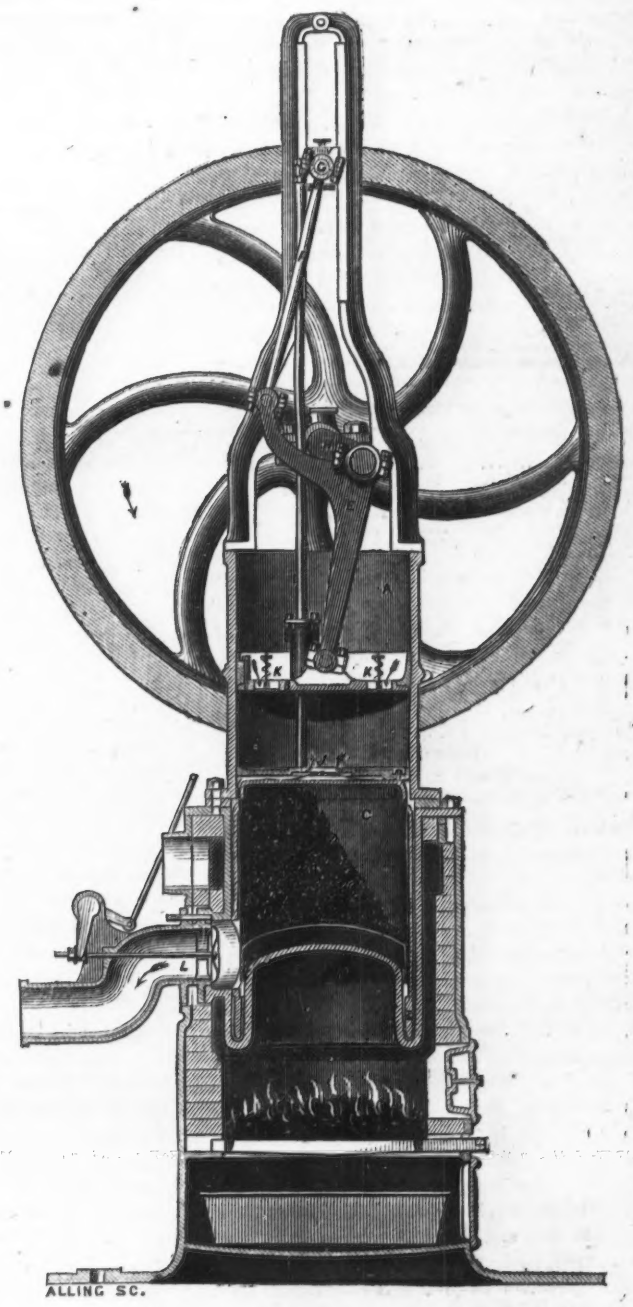
THE engine which we herewith illustrate differs in some important points from any hitherto made. Among the chief of these we may mention the peculiar relative motion of the two pistons, imparted by a novel attachment to the connecting-rod, which is clearly shown in the sectional view.

The cold air is drawn in through valves in the upper or main piston, by the rapid descent of the shifter, which movement at the same time expels the heated and power-exhausted air below it through the exhaust-valve L. When the main piston has reached half way down its stroke, the shifter is at the bottom of the cylinder, and the space between the pistons full of fresh cold air. At this point the exhaust-valve closes, and as the main piston progresses in its stroke downward, the air is compressed into a much smaller space, and consequently has a higher pressure; the shifter now returning on its up-stroke, rapidly approaches the main piston, causing the cold and compressed air to pass through the valve, J, into the heater, as shown by the arrows. Here it is dilated by the heat, and, by increased volume and pressure, drives both pistons (which have now come into close contact) upward to the termination of the up-stroke, at which point the exhaust-valve opens and the operation is repeated.

It will be seen that the side-motion of the connecting-rod imparts a peculiarly regulated vertical motion to the cross-head, G, through the links, F, and



CALORIC PUMPING ENGINE.



CALORIC ENGINE—SECTIONAL VIEW.

thence to the shifter through the rods, i, i ; this simple device accurately producing the graduated motion of the shifter, on which the efficiency of the engine so much depends.

It will also be seen that the cold air is drawn through the main piston at each stroke ; this keeps the main piston and packing cool, and adds greatly to the durability of the packing and cylinder. The great advantage of dispensing with a separate pump is also apparent in the economy of material and friction.

These engines are admirably adapted for all light manufacturing purposes. They require so little attention and fuel that the expense of running them is merely nominal, being very small in proportion to the work done. They are all carefully tested by PRONEY'S brake, before leaving the works, and are warranted to be fully up to the power represented.

They are chiefly used for pumping, running small printing presses, for furnaces having power, for bookbinders and other purposes where it is possible to replace animal power or manual labor by a cheap and safe prime-mover.

The manufacturers have spared no pains or money in making this engine perfectly in accordance with the plans of the inventor, whose engineering ability is well recognized by the mechanical world. The materials used in the construction are of excellent quality, and the engine is, we think, calculated to give very economical results, and good satisfaction to those who use it.

Communist Explosives.

THE incendiary compounds employed by the agents of the Commune have been submitted to analysis. The following are the elements of some of them :

Sulphur	12 parts.
Resin	4 "
Saltpetre	8 "
Suet	1 "

Fire boxes, containing a somewhat similar mixture have been found, as follows :

Saltpetre	31.50 parts.
Resin	9.00 "
Charcoal	2.25 "
Sulphur	47.25 "
Suet	3.00 "
Camphor	12.00 "

The Fenian fire, composed of sulphur, of carbon, and of phosphorus, did not, it appears, come into the hands of the incendiaries, although the Commune requisitioned all the available quantities of these materials.

Loss by Volatilisation in Certain Metallurgical Operations.

By CHARLES P. WILLIAMS,
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IT is a well-recognized fact, pointed out by an expensive experience, that in all methods of lead smelting, and in oxidizing and chloridizing roastings generally, a very considerable loss of metals results. This loss is brought about either by the formation of more or less volatile compounds, or by the draught of the furnace carrying, mechanically suspended, particles of chemically changed ore, with the products of combustion, or, in the case of muffle furnaces, with the atmosphere sweeping over the ore therein treated. The problem of devising an economical and complete method of collecting these metallic vapors or fumes is one of very considerable difficulty, and it may be fairly questioned if it has yet received a satisfactory solution. In this country, where rich lead ores are abundant, and where all the elements, except labor, entering into the metallurgical treatment of such ores are comparatively cheap, this matter of condensation and collection has not generally forced itself upon the attention of practical metallurgists, but it is, nevertheless, of considerable significance.

In the treatment of silver-bearing ores by smelting operations, or where a previous chloridizing roasting is necessary, the loss of silver by volatilization must be of significant importance, and will yet, if it has not already, give rise to a study of the means adapted to its prevention. Various European experimenters have given different figures for the loss of silver by volatilization in different methods of its extraction ; but these figures may safely be averaged as ranging between 0·5 and 4 per cent. of the content of the original ore. With regard to chloride of silver, it is well established that its volatility is greatly increased by the presence of other chlorides. PLATTNER'S experiments on the Augustin method of silver extraction* show that a mixture of 10 parts of oxide of copper, 3 of chloride of lead, and 0·6 of fused and finely-divided chloride of silver, lost, on roasting in a current of air, 6·61 per cent. of the original weight by volatilization. The sublimate, on quantitative examination, gave 63·8 per cent. chloride and oxide of lead (containing 54·8 of metallic lead), 32·8 per cent. of cuprous chloride (containing 21 of copper), and 3·4 of argentic chloride (containing 2·6 of silver). These figures would give 5.09 as the percentage of the loss of the chloride of silver contained in the original mixture, partly due to the volatility of chloride of silver itself, but chiefly brought about, however, by the presence of other chlorides. In the oxidizing roasting of sulphuretted compounds of silver, the loss is also great, through the volatilization of the sulphate, etc., of themselves, or increased by the presence of compounds of other metals, or through the mechanical movement of fine particles of the ore by the draught through the furnaces.

In the treatment of galena for the extraction of lead, whether by the process of reaction or by other means, a large amount of the metal is lost, chiefly in the forms of sulphate or of oxide. This loss, though admittedly large, is not fully appreciated, and is, without doubt, due, not merely to the volatility of the oxide of lead (this being partially changed into sulphate), but also to the facts that sulphate of lead is volatile, and that sulphide of lead is readily and rapidly volatilized at elevatedtemperatures, and is subsequently converted into sulphate either through the action of the oxygen of the air or through that of sulphuric acid. This latter production of sulphate is well established by the researches of PLATTNER,† and his observation of pseudomorphous crystals of plumbic sulphate after sulphide of lead, which had formed after the condensation of the latter crystals from a vaporous condition. The writer of this communication has invariably observed during repeated exhaustive analyses of the so-called Bartlett white-lead, and of oxide of zinc produced at the Keystone Zinc Works, the presence of sulphide of lead. Both of these substances are essentially mixtures of oxide of zinc and plumbic sulphate obtained by the treatment of mixed galena and blende by the well-known process for the manufacture of zinc-white directly from the ores. On treatment with hyposulphite of soda, the sulphate of lead is readily dissolved, whilst a subsequent addition of dilute acetic acid will dissolve the remaining ingredients, leaving a small amount of dark metallic particles, which, on chemical and microscopic examination, are found to be minute crystals of sulphide of lead.

Mr. G. T. LEWIS, a well-known manufacturer of Newark, Del., has repeatedly completely volatilized several hundred pounds of the purest galena obtained in the Wisconsin lead region. The products of these treatments (which were chiefly conducted in the Wetherill furnace for the manufacture of zinc-white), were collected by the "bag-process," and have been analysed by the author. They are mixtures of sulphate of lead (commonly about 60 per cent.), with some oxide of lead and zinc, and carbonate and sulphite of lead, and invariably contain small and variable amounts of sulphide of lead.‡ From these experiments the high degree of volatility of this last-named compound must be admitted, unless it be claimed that it is first converted into sulphate, and that this salt is even more volatile than the sulphide. The author has made efforts to establish the degree of volatility of the sulphide of lead by strongly heating the artificially-prepared salt in currents of nitrogen and hydro-sulphuric acid, but has found so many difficulties in the preparation of a perfectly dry and unaltered compound, that he cannot, as yet, regard his results as removed beyond sources of fallacy.

Plumbic sulphate is also to a slight degree volatile. Some of the perfectly dry and pure artificially-prepared salt was strongly heated for one hour, in a porcelain tube, through which a current of dry air freed from carbonic acid was drawn. Thus treated, 1·4082 grms. of the sulphate lost in weight 0·0019 grms., equivalent to 0·134 per cent. A second experiment with 4·2761 grms., but heated for upwards of two hours, showed a loss of 8·5 milligrammes, or a little less than 0·2 per cent. Other trials showed variable losses, but in no instance was the percentage amount greater than that obtained in the second experiment. Examined with a glass, indications of fusion of the sulphate were noticed. That this method of producing sulphate of lead in lead smoke or fumes is of much moment compared with that of the volatilization and subsequent oxidation of the sulphide, can hardly be claimed, though it, doubtless, is one of the many causes of the loss of lead in metallurgical operations.

Another cause of loss is the mechanical one brought about by the currents of air, and of the products of combustion sweeping through the furnaces. In furnaces of that description, where the fuel is intermingled with the ore under treatment, or where the gases, vapors, etc., from the fuel in the fire-box pass over and in contact with the charge, this mechanical loss is, doubtless, increased by the presence of fuliginous particles of finely-divided carbon, which enclose, and, as it were, buoy up, the denser particles of metallic compounds. Where the metallurgist has to deal with the lead ores which contain zinc compounds—by no means an unusual condition of affairs—it will be admitted that the formation of zinc vapors and their subsequent conversion into the specifically light oxide of zinc, will add greatly to the loss of lead as sulphide or as oxide by assisting mechanically in carrying these compounds from the furnace in a manner similar to that in which the sooty particles of carbon may act. The volatility of silver as oxide or as sulphate may be fairly assumed as increased in this same manner. The experiments of Malaguti and Durocher,* made with argentiferous zinc blende, indicate that the loss of silver in the presence of zinc compounds may be very considerable, reaching as much even as 70 per cent. of the original content of the ore, but ranging usually according to the richness of the ore in silver and in zinc, and according to the management of the furnaces, between 15 and 60 per cent.† A small proportion of this loss is unquestionably due to the volatility of the sulphate of silver, but, as in the case of ores not carrying zinc, and not highly siliceous, the loss is less than 10 per cent.,‡ it must be admitted that zinc compounds dispose silver to volatilize.

The ores mined in the Silurian lime-stones of Sinking Valley are chiefly intimate mixtures of zinc blende and galena (the latter forming usually about 20 per cent. of the mixture), and contain, on the average, by the assays of the author, about 5 ounces silver to the ton of 2000 pounds, though ASHMEAD finds‖ by his assays 8.5 and 9 ounces. These ores are treated, at the Keystone Zinc Works, for the manufacture of zinc-white by the ordinary process, and in the residues on the perforated grate bars of the furnace, the writer has never been able to find weighable quantities of silver, though operating repeatedly on amounts of 58½ grms. By dissolving a weighed amount of the so-called "oxide" made from this ore, and collected in the "bags" in nitric acid, evaporating to dryness, adding hydrochloric acid, extracting with water, and assaying the residue in the usual manner, 0·014 per cent. of silver may

* Berg-und Huttenmänische Zeitung e, 1854, p. 125 et seq.

† Procedes Metallurgiques de Grillag e, p. 207 et seq.

‡ The method of analysis followed in these investigations was essentially that described by the author in the *Journal of the Franklin Institute*, for March, 1869.

* Annales des Mines, xvii., 1850.

† Plattner, *loc. cit.*, p. 118.

‡ Kerl's Handbuch der Hüttenkunde, i., 2d edition, p. 89.

‖ American Chemist, vol. i., No. 4, p. 134.

be found, corresponding to 4·2 ounces to the ton of "oxide." The "Bartlett white lead," prepared in a similar manner from mixed blende and galena, mined in Davidson county, North Carolina, yields a somewhat smaller percentage of silver (0·0087 per cent.) though the original ore is more highly argentiferous than that utilized in Pennsylvania. This discrepancy may be accounted for, however, by the fact that the North Carolina ore is roasted (with the addition of salt?) at the mine before shipment to New Jersey for its conversion into the basis of a pigment.

The following analyses will exhibit the composition of lead fumes by various operations :

	I.	II.	III.	IV.	V.	VI.
ZnO	72·083	73·426	49·50	13·80	25.70	9·23
PbO	0·274	—	27·90	10·20	43·30	13·21
SbO_3	trace	—	AsO_3 2·10	—	3·90	—
Fe_2O_3	trace	—	—	3·40	—	trace
$PbOSO_3$	23·968	25·084	13·00	66·60	14·40	74·05
$ZnOSO_3$	0.810	0·574	— PbS	1·40	—	trace
ZnCl	0·839	—	—	—	—	—
Fe_2Cl_3	0·071	—	—	—	—	—
$SbCl_3$	trace	—	—	—	—	—
CdCl	0 256	—	—	—	—	—
$CdOSO_3$	—	0·187	—	—	—	—
$CaOCO_2$	— and loss	0·729 CO_2	7·00	—	4.50	3·27
Clay	—	—	—	5·60	—	SO_2 0·84
Per cent. pb in above	16·624	17·132	34·778	56·169	54·571	62·840
Ag	0·0087	0·014	—	—	—	0·0019

Analyses I., II., and VI., are by the author; III., IV., and V., are from Watts' "Dictionary of Chemistry," Art. "Lead." No. I. is the so-called Bartlett White Lead; II. is the zinc-white from the ores of Sinking Valley, Pennsylvania; III., fumes from blast furnaces at Freiberg; IV., fumes from reverberatory furnace at Alston Moor; V., from refinery at Freiberg; VI., from Wisconsin ores treated at Birmingham, Pennsylvania, in the Wetherill furnace for the manufacture of zinc-white; Nos. I. and II. were also obtained by treatment in the same furnace. The three analyzed by the author all contained sulphide of lead, but the amounts were small, and were not estimated.

Estimates based upon the treatment of a large amount of ores have given the following figures, making evident the loss in the treatment of lead ores by conversion into merchantable lead, though unfortunately no descriptions of the characters of the ores are furnished. A blast hearth furnace treating 267,008 pounds, yielding by assay 75·75 per cent., or 202,258 pounds, gave 178,895 pounds, or 67 per cent., exhibiting, therefore, a loss of 23,363 pounds. The refining process gave a further loss of 13·40 per cent., whilst the reduction of the dross from the refinery added a still further loss of 3·60 per cent., giving an aggregate of more than 28½ per cent. of the original content of lead.*

If considerations of the health and property of a neighborhood are only of subordinate importance, such figures must make evident the necessity of connecting with lead establishments, suitable apparatus for the condensation and saving of this fume. The process of straining the fumes through muslin or fine canvass, which gives such successful results in the collection of zinc fume or oxide as exemplified by the well-known "bag process," has not received from metallurgists the attention its simplicity and completeness merit. From experiments made on a large scale on galena ores, both nearly pure, and containing a large amount of blende, the writer is satisfied that its application to the condensation of lead and other metallic fumes would leave little to be desired. It seems strange that it has not been applied to purposes other than the mere saving of oxide of zinc, especially when the necessity of a thorough collection of metallic fume is considered. Its satisfactory use in the treatment of sulphuretted ores, it is true, would be somewhat lessened by the fact that the fabric of the bag would be rapidly destroyed by sulphuric acid, etc.; but even this difficulty might be obviated by washing the mixed gases and metallic vapors by conducting them into a brick chamber through which water in the form of rain is falling. The water from this chamber might be run off through caustic lime to remove soluble metallic salts. The ordinary blower working in the flues between the zinc furnaces and the bags would prevent any injury to the draught of the furnace.

A discussion of the various mechanical devices and combinations already in use in England and elsewhere, for preventing or reducing the loss by volatilization at lead furnaces, is not deemed necessary in this connection. The results of VON PATERA's experiments* made on a small scale, and having in view the saving of argentiferous fume through chemical reagents and reactions, may yet be found to contain the germs of important technical applications. Especially may this be true of those obtained by the use of sulphydric acid, whereby waste sulphurous acid may be converted into sulphur, and a complete saving of volatilized silver and lead compounds be effected.—*Journal of the Franklin Institute.*

* These figures are condensed from the elaborate tables in Watts' "Dictionary of Chemistry."

Smelting Processes at Freiberg.*

* Read before the American Philosophical Society, June 17.

By PERSIFOR FRAZER, JR.

"POLING," OR THE PRODUCTION OF TYPE METAL.

THE Abstrich obtained by scraping off the scum which forms in the Lead Refining Process after the mere mechanical impurities of the first fifteen minutes of melting have been removed, is divided into two parts. (1) The Abstrich which is formed during the first half of the time. (2) Abstrich. (Abstrich consists, in general terms, of arseniates and antimoniates of oxide of lead.)

The desilverization of the first abstrich consists in melting it in a refining furnace whereby the raw lead which has been mechanically mixed with the abstrich is liquated, while the abstrich itself, remaining unmelted, floats on the surface and can be scraped through the open door of the furnace into iron pans.

The lead which is thus separated is drawn off into a hemi-spherical kettle with a long nozzle, and is poured by means of this into a series of radiating lines of iron moulds. The desilverized abstrich is melted in cupola furnace with coke to a lead tolerably rich in antimony. In order to get rid of the copper still more completely and to obtain a product in the form desired for commerce, it is again melted gradually in a Pattinson kettle, and the lead is entirely freed from copper by successive formations of "Schlicker," aided by stirring with a pole of green wood. The heat decomposes the wood, and the gases and steam which rise through the molten metal occasion a still further agitation of the particles and bring every part to the surface. In place of poles an iron cage filled with faggots of green wood, and fastened to the end of a long screw fitting into a nut which is supported by two iron rods to uprights in the masonry around the kettle, is employed. Two arms like those of a letter press allow the cage to be raised and lowered, and at the same time turned round and round in the molten mass.

CUPELLATION.—This operation consists in a further manipulation of the Raw Lead from the Lead, and Lead Matt Processes after its refining and concentration. The plan is to separate the lead and silver by an oxidizing, melting in contact with flame, on a covered hearth and with the aid of an artificial draught. The air admitted through the tuyeres oxidizes the lead, and the melted oxide being specifically lighter than pure lead floats on top and is easily separated from it. In this way the silver, which is with difficulty oxidized, is obtained comparatively free from impurities, and containing from 90 95 p.c. of silver.

The construction of a cupellation furnace being generally understood needs no mention here.

After the melting of the lead the fire in the furnace is increased.

The fuel consists of split faggots. About 5 to 5½ cords are consumed in cupelling 350-380 cwt. of lead in 75 to 80 hours, counted from the time the lead was put in the furnace. At the same time the fire is increased, the blast is increased also. Supposing the lead not to have been entirely refined, an abstrich is first formed on the surface of the molten lead, and is drawn out with the scraper (a small round piece of wood, 6 inches in length and 1 to 2 inches in diameter, fastened crosswise to the end of a long iron bar).

* Zeitschrift für Berg und Hüttenwesen, 1854, p. 83.

After these impurities have been removed, the real litharge formation begins, and the molten oxide is run off by means of little cuts made in the dam of clay by the working door. An iron mould in the shape of a rectangular prism lacking 3 sides is placed with one open side against the wall of the furnace immediately under the working door, and in filling, this mould cools, and the litharge is transported in large blocks of from 16 to 17 centners to an adjoining room, which are broken in pieces in order to separate the red lithrage from the yellow.

These are to be distinguished :—

1. *Yellow litharge*, with about 0.04 to 0.05 per cent. of silver, is smelted in the cupola furnace.

2. *Red litharge*, with very little silver, is found in the interior of the lumps of litharge obtained from the cupellation.

3. *Separation litharge*, which is produced just before the silver blicks; *i. e.* the last portion of the lead separates from the silver, and the latter suddenly assumes a bright, clear surface.

As the surface of the molten lead becomes continually lower, it is necessary to cut the groove for the melted litharge deeper and deeper, and great skill and experience are required to prevent the rich lead escaping with the litharge. The absorption of the liquid lead into the solo of the hearth gives rise to the formation of bubbles of carbonic acid from the calcareous mass of which it is composed, and this gives the cupeller a means to guide him in running off the litharge. The groove is not cut till this border of bubbles is about two inches wide. After so much litharge has run out of the first groove that the litharge mould has been filled three times, the groove is closed, and enough refined lead is added to bring the contents of the furnace once more to the old level. Another groove is then cut near the first one, and three moulds are filled through this; after which a third groove is cut still further to the left etc. After this, when the requisite amount of lead has been added, the first groove is again opened, &c, till each groove has been used three times, at each time filling three moulds of 16 to 17 centners each, which makes 16+17=432 centners.

The amount of air conducted through both tuyeres per minute is equal to 180 cubic feet.

The charge of the cupellation furnace during the litharge period requires very great skill and experience from the cupellers. As the surface of the lead sinks more and more, the tuyeres must be more and more inclined to bring the current of air upon it. There seems to be no difference between the chemical constitution of red and yellow litharge. According to the most accurate results yet reached, the proportion of red lead which is obtained appears to depend upon the purity of the lead and the length of time it takes in cooling.

The nearer the process approaches to the "Blick," the slower is the formation of litharge, till at last it can only be continued by a very strong fire. With the exception of this part of the litharge period, the temperature during that period must be lower than during the formation of "Abstrich," with which cupellation begins.

SILVER BLICK.—When the molten litharge becomes so small in quantity that it can no longer cover the surface of the silver beneath it, the mass becomes suddenly very bright, and shows the sea-green color of melted silver.

Figures like flowers and waves appear on the surface of the molten silver, and are occasioned by the covering of fused litharge forming no longer a continuous sheet on the bath, but becoming more and more net-like, while the bright silver below shines

more and more through the openings, till finally the last particles of litharge are driven to the edge of the hearth. This is the juncture to which the name "Silver Blick" has been applied. As soon as this appearance ensues, the fire is quenched quickly by throwing pails of water upon it, the blast is stopped and hot water is poured upon the "Blick Silver" by means of an iron trough, in order to cool it as rapidly as possible.

When the "Blick Silver" to be obtained is too heavy to be easily handled, a "silver knife" or thin iron beam, with several branching arms on each side, is lowered down into the metal before it hardens, so that it can be easily broken in pieces. Without this arrangement it would be very difficult to break the silver, and considerable loss would be likely to ensue in order to do so. The cover of the cupellation furnace is lifted off and swung to one side, and the silver is removed to some place of security until ready for refining. This "Blick Silver" contains still 4 to 5 p. c. of impurities, chiefly copper, lead, and bismuth, the latter having even a greater affinity for silver than lead. The weight of one of these "Silver Blicks" is from 2 to 6 centners. Only a small part of the silver goes into the hearth, or elsewhere into the plumbiferous products of cupellation.

The sole of the hearth, which is soaked with oxide of lead to a depth of 2 to 3 inches, breaks off in separate scales from that portion of the mass into which the litharge has not penetrated. It is known simply as "Hearth," and is either treated in the Lead Matt Process as a reagent, or is smelted in cupola furnaces by itself with coke to a pure Raw Lead, the earthy constituents of the hearth mass forming a slag very difficult to fuse. The part of the hearth which has not been in contact with the molten litharge is broken up, and used, together with new material, in the formation of the next hearth in the cupellation furnace. By the treatment of foreign (American) ores, a "Blick Silver" is obtained containing 0.11 to 0.15 p. c. of gold. This is treated by itself. From the cupellation of 350-380 centners of pattinsoned Raw Lead there result 330 centners yellow and red litharge, of which the 1-5 to 1-3 part is red, and contains about 1.5 p. c. silver. Red litharge is packed in kegs and sold, while the yellow is reduced to pure lead. The weight of the cupellation hearth is from 38 to 40 centners.

The "Blick Silver," before reaching the fineness required for the mint, must be still further refined.

Refining of Blick Silver.—This work consists of a continuation of the cupelling process, whereby the silver is so far purified from the other metals that it can be immediately used by the mint without further refining.

The silver refining furnace in which this operation is conducted very nearly resembles the English reverberatory furnace, but is smaller. It has, besides, a blast through two tuyeres situated near the fire bridge and one on each side of it, and instead of the immovable brick vault over the hearth, a movable iron cover, which, by means of an attachment to a windlass, can be hoisted and moved to one side, as is the case with the cupellation furnace.

It is necessary to prepare the material for its hearth sole at least two days before. It must be sifted as fine as possible and moistened with water. This mass is spread upon the hard-burnt fire-brick, and after being pounded hard is scraped into a basin form, the lowest point being in the middle, and the sole being here 1½ to 2 inches in thickness. In the centre of this basin a hemispherical pot is made, in order to allow the silver to collect, and to render the ladling out more easy.

After all these preliminaries have been attended to, a small fire of coke is built upon the hearth, in order to dry it, whereupon the cover is put on and luted with clay. Before the Blick Silver can be placed in the furnace, the latter must be not only entirely dry, but shortly before this must have been brought to the highest possible melting heat, as otherwise numerous cracks would appear in the hearth, and the silver would be more difficult to melt.

The hearth must, therefore, be brought to a bright red heat just before the Blick Silver is put in.

For this purpose, 8 or 9 hours before the introduction into the furnace of the Blick Silver, a light fire of stone coal is kindled in the blast furnace, and this is gradually increased until, just before the Blick Silver is put in, the furnace has reached the highest possible temperature. In placing the blocks of Blick Silver into the furnace, care is taken to bring them near the fire bridge, where they get the greatest amount of heat. If all has not been put in at once, the remainder is added after the silver already in the furnace has been melted. The working door is then closed by an iron slab, and it, as well as all other apertures luted with clay, and the fire increased.

If, after two or three hours, the silver is melted, the heat must still be continued, and a weak stream of air must be admitted to the silver bath from the tuyeres on both sides of the fire bridge. From time to time the molten metal is stirred up with the stirring iron, in order to bring all impurities which may be contained in the silver to the surface. Finely-pulverized hearth-mass is strewn over the surface, and aids in absorbing the liquefied oxides of bismuth and lead. It is scraped from time to time out of the working door. After several hours, during which the temperature has been maintained uniformly, and the molten metal well stirred, a small quantity is taken out in the assay spoon to ascertain how far the silver is refined. Only when the fracture shows satin lustre and perfectly white color, is the silver of requisite fineness. Next to these appearances is the reflecting power of the molten bath to be observed. When any of the implements are held over the surface of the silver, a perfect image must be observed in the latter. Very often it is found that, though the reflection is perfect, the fracture is gray and granular, a proof that the silver has absorbed too much oxygen from the blast. As the silver in this condition is brittle, and not suitable for the purpose of coining, the absorbed oxygen must be got rid of by strewing small lumps of coke of the size of a walnut upon the surface, whereby the oxygen is driven off in carbonic acid. As soon as it is evident that the silver is fine, and can be drawn out without exhibiting cracks at the edges, it is subjected to another high melting heat, in order to bring it to the proper condition to ladle out. Before ladling out, the blast is stopped, and a granular test is taken—*i. e.*, a little of the molten silver is taken out in the assay spoon and poured over the moistened ends of a birch broom into water, when it granulates. This is assayed to ascertain the degree of fineness. This silver is given to the Director of the Works for assaying. After this, the silver is poured into iron pans holding 25 to 30 lbs., which must previously be coated with a layer of clay, as must also the ladle itself. The latter is heated red hot before being dipped into the silver, to prevent particles of the precious metal from adhering to it.

In this manner 20-25 centners of Blick Silver can be refined in ten to twelve hours, with an expenditure of eight to nine bushels of slaty coal.

If it is desirable to refine more silver, it can be introduced into the same furnaces without changing the hearth. After ladling out, the oxygenated condition of the silver shows itself in the phenomenon of spurting. Silver possesses the curious power of absorbing oxygen in its molten state, and then suddenly giving it up before it congeals. This gives rise to a spurting of the silver; and to prove that during this phenomenon oxygen is really set free from the silver, it is only necessary to strew coal-dust on the surface of the metal. At the moment of the spurt this coal takes fire, and burns up with great rapidity. The blocks of silver are then turned out of the moulds, and the little irregularities of surface are smoothed down with a file and brush. Its fineness must be now at least 99 p. c. of silver. It is usually about 99.4, and contains only traces of copper, bismuth, and lead. The degree of fineness is determined by a volumetric analysis.

[To be continued.]

Analysis of a Clam Shell.

FROM whence does the clam obtain the lime needed to form its shell? This is an interesting question, and one we have often asked ourself when observing the bivalves in salt and fresh water basins. As considerable lime is found in sea-water, the question is not so puzzling in its connection with the clams, oysters, etc., of the ocean, as with those of our fresh water lakes.

In order to obtain light upon the matter, we took from Lake Kenosa, upon which our farm borders, a *Unio* or blue-shelled muscle, and, separating the shell, submitted it to a chemical analysis. The amount of lime contained in it, in the form of carbonate, was 14.75 grams, with a trace of phosphate. We also subjected the water of the lake to analysis, and found that each 1000 grams of the water held 0.0268 grams of lime, principally in the form of carbonate. These results show, if the clam obtains its lime wholly from the water which passes through the organs of assimilation, that 532 litres would be required, or, in other words, more than *four barrels* of the water of the lake were needed to supply the lime which the clam derived from some source. We have thus far investigated the matter strictly from the chemist's stand-point, and having but little knowledge of the nature of the food required by the clam, or its habits, etc., we would ask some of our naturalists to enlighten us upon these points.—*Boston Journal of Chemistry.*

Why Circles Please the Eye.

PROF. MULLER, in a course of lectures in Berlin, offered a simple and mechanical explanation of the universal admiration bestowed on these curves. The eye is moved in its socket by six muscles, of which four are respectively employed to raise, depress, turn to the right, and to the left. The other two have an action contrary to one another, and roll the eye on its axis, or from the outside downward, and inside upward. When an object is presented for inspection, the first act is that of circumvision, or going round the boundary lines, so as to bring consecutively every individual portion of the circumference upon the most delicate and sensitive portion of the retina. Now, if figures bounded by straight lines be presented for inspection, it is obvious that but two of these muscles can be called into action; and it is equally evident that in curves of a circle or ellipse all must alternately be brought into action. The effect then is, that if two only be employed, as in rectilinear figures, those two have an undue share of labor; and by repeating the experiment frequently, as we do in childhood, the notion of tedium is instilled, and we form gradually a distaste for straight lines, and are led to prefer those curves which supply a more general and equable share of work to the muscles.

Wood Pulping Machinery.

AT Gothenburg, in Sweden, the manufacture of paper from wood is about to be undertaken. The machinery comes from England, and is to be used in a large mill in that vicinity for the conversion of wood into pulp for paper-making. Gentlemen who have lately returned from Sweden state that the erection of these mills is going on rapidly, and several of them are already at work in the wooded districts. Grinding was formerly the mode of reducing the wood to a glutinous state; but compressed steam, with chemical preparations, is now being used with success. Skilled workmen are being sent out from this country to erect the machinery and put the mills into working order.

WE are indebted to CHATFIELD & Co. for several new publications, which we shall notice in our next issue.

THE COAL TRADE.

B. B. WESTERN, COAL EDITOR.

Anthracite Coals.

NEW YORK, August 4, 1871.

WHOLESALE.—There has been a good feeling in the market since the last auction sale, and the confidence generally felt by buyers has induced large sales. Lehigh Coal is specially in demand, and Lump and Egg particularly scarce. The following are the prices for August, as agreed upon by the Lehigh Coal Exchange:

NEW YORK, July 27th, 1871.

At a meeting held this day, the following prices were adopted for August shipments at Elizabethport, Port Johnson and Hoboken:

Lump	$6.25
Broken	5 65
Egg	5.50
Stove	6.00
Chestnut	4.85

E. BELKNAP, Secretary.

The Scranton Company have fixed the following prices for August for what surplus Coal they may have over and above what was sold at the sale: Lump, $4.80; Steamer, $4.90; Broken, $5.10; Egg, $5.50; Stove, $5.75; Chestnut, $4.75.

The following prices of Wilkesbarre Coal are taken from the circular of the Wilkesbarre Coal and Iron Company for August: Lump, $4.65; Steamer, $4.65; Broken, $5.00; Egg, $5.25; Stove, $5.75; Chestnut, $4.75—on board vessels at Port Johnston; 30 cents additional delivered alongside at New York.

WHITE, FOWLER & SNOW quote McNeal Lehigh Coal at: Lump, $6.25; Steamer and Broken, $5.65; Egg, $5.50; Stove, $6.00; Chestnut, 4.85.

The Delaware & Hudson Canal Company make the following quotations for their excellent Lackawanna Coal, *to contractors:* Lump, $4.70; Steamer, $4.90; Broken, $5.15; Egg, $5.40; Stove, $5.75: Chestnut, $4.85.

The following circulars explain themselves:

PHILADELPHIA & READING R. R. COMPANY.

OFFICE SCHUYLKILL CANAL,
No. 417 WALNUT STREET.
PHILADELPHIA, August 1, 1871.

On and after this date there will be paid a drawback of fifteen cents a ton on all Anthracite Coal shipped from Schuylkill Haven and Port Clinton to New York and vicinity, during the month of August. Until further notice freight by Company's line of barges to New York will be $1.85 per ton.

F. B. GROVER, Pres't.

Lehigh Valley Railroad Company.

MAUCH CHUNK, August 1 1871.

NOTICE TO COAL SHIPPERS.

From this date, until further notice, the following rates of transportation will be charged by this Company on coal shipments to the several tide points:

	P.H.	M. C.	P.PY.	P.DEL
To Mauch Chunk	$ 0 15	....	....	....
To Philadelphia	1 00	0 85	....	....
To Elizabethport	2 26	2 11	1 26	....
To Port Johnston	2 26	2 11	1 26	....
To Newark	2 62	2 47	1 62	....
To Hoboken	2 26	2 11	1 26	....
To way points on N. J. railroads, via Morris Canal	....	1 15	....	....
To New York	....	2 59	....	1 74
To Jersey City	....	2 54	....	1 69
" do " for shipment	....	2 14	....	1 29

At Jersey City an additional charge of twenty cents per ton will be made for transporting coal from boat to the track, and thirty cents per ton for placing the same on the wharves and re-shipping.

The above tolls do not include wharfage or shipping expenses at tide ports. ASA PACKER, Pres.

We advise buyers to come to market and take their coal now, before rates are further advanced, or any complications arise in the coal regions. Already we hear of trouble and dissatisfaction in the various regions. At Mahoney City the men of one of the leading mines are on a strike for the basis of 1869, which, it will be remembered, is the "$3 00 basis". The committee to fix the wages in the Schuylkill region met on the 15th inst. It is said the operators will announce a reduction of four per cent. If this be done, the men say there will surely be trouble, as they will suspend until their demand for fair wages is complied with. They seem to be united in their determination to insist on what they term living wages.

All these straws show which way the wind blows—and the wise ones will take warning.

FREIGHTS.—Vessels have become somewhat scarce under an extra demand, and rates have advanced from 15 to 25c. Thus it will be from time to time as the season advances.

CUMBERLAND COALS.—The demand is good, and prices are easily maintained. There is a good business doing among manufacturers and steamship companies. Ferries are large users of Cumberland coal also, of late.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 29, 1871, compared with week ending July 30, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
*Phila & Reading R.R.	31,762	1,246,780	110 928	1,882,481
Schuylkill Canal	3,854	90,845	43,160	465,779
Lehigh Valley R. R.	61,233	1,827,825	78,487	960.319
Lehigh & Sus. R. R.	15,348	542.278	38,521	588,047
Lehigh Canal	22,791	299,692	31,130	220,219
Scranton North	21,731	408,645	18.391	168,824
" South	33,819	1,024,671	41.873	411,607
Penn. Coal Co., rail	23,103	845,792	27,694	256 437
" " canal	718	9,796	600	5.307
Del. & Hud. Canal Co.	53.719	833,369	36,591	355,939
" " East	6,153	222 795	10 330	141.369
" " West	2.422	46.803	4.211	40.250
South	10,502	258 415	11.907	126,288
Shamokin	19,620	226,152	15,775	361,734
Trevorton	2,260	45.115	....	....
Lykens Valley Coal Co.	....	20,102		47,312
Wyoming South	8,669	136,149	....	....
Wyoming North	....	....	....	4,167
P. N. Y. C. & R. R. Co.	5.408	174,539		104,987
Williamstown Col'y	7,238	164,758	....	....
Big Lick Col	....	37,039		70,994
Total	336,398	8,270 550	473,198	6,211,860
1870		6,211,860	336 898	
Decrease		2,058,690		
Increase				136,300

* Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending July 29, 1871, compared with week ending July 30, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
B. & O. R. R.	9,499	283,430	10,181	369,025
C. & O. Canal	13,867	475,345	22,394	704,788
H. & B. T. R. R.	7 452	179 848	5,384	207,285
Harrisburg & D.	16,824	456,836	15,475	469,610
*L. V. R. R.		9.380	8,550	
P. & N.Y.C. & R. Co.	5,058	139,732		230,293
Cumberl'd Branch Canal	1 947	57.389	4,417	105,052
" Railroad	1,176	53,3 5	993	43,425
Total	55,823	1,649,325	67,394	2,129,478
			55,823	1,649,325
Increase.			11,571	480,153

* From this week the tonnage of the P. & N. Y. C. & R. R. Co. will be included in that of the L. V. R.R. Co.

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Sus. Div.)

Week ending July 29—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1871., tons ct	WEEK 1870. tons ct.	YEAR 1871 tons cwt.	YEAR 1870. tons cwt.
Wyoming Region	39707 03	26686 16	620940 01	667817 18
Upper Lehigh Region	4148 17	3970 17	23210 02	79034 01
Beaver Meadow Region				
Hazleton Region	10353 07	13024 17	41713 02	147595 11
Mahanoy Region				
Treskow Region	3624 18		15074 16	
Mauch Chunk Region	7033 13	119 09	88453 04	30315 10
Totals	64767 18	43801 19	789391 05	924763 00
Increase	20965 19		135371 15	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	38520 14	15343 01	588046 16	542277 16
Forwarded East of Mch Chunk by Canal	19853 17	21932 14	117061 12	229234 16
Delivered at and above Mauch Chunk	1034 18	750 03	31891 14	23634 09
Delivered to L. & B. R. R. at Plymouth Bridge	5027 03	5354 11	31903 02	115619 02
L. V. R. R. at Packer'n	331 06	416 10	20488 01	13096 17
Totals	64767 18	43801 19	789391 05	924763 00
Of the above there was transported on acc'nt of L. C. & N. Co.	11564 18	119 09	120006 18	46949 07
W.-B. C. & I. Co.	23416 09	12922 10	469364 01	299902 08
Totals	35081 07	13041 19	589374 19	346871 15
Increase	2.039 08		233503 04	
Decrease				

Lehigh Canal Coal Trade.

Shipped for the week ending July 28, 1871.

	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total from Mauch Chunk Region	9402 19	100893 00
" " Beaver Meadow "	4028 10	12749 00
" " Treskow "	1463 05	6514 12
" " Mahanoy "	94 10	2481 13
" " Hazleton "	10264 17	41385 06
" " Upper Lehigh "	1053 09	3613 09
" " Wyoming "	4823 07	12681 15
Total	31130 07	220218 15
Corresponding week last year	29290 11	299682 04
Increase	1839 16	
Decrease		79463 09

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, July 29, 1871.

	Tons. Cwt.
From Port Carbon	
" Pottsville	
" Schuylkill Haven	39,945 09
" Port Clinton	3,215 00
Total for week	43,160 09
Previously this year	422,618 14
Total	465,779 03
To same time last year	99,845 09

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, July 29, 1871.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	38,646 06
" Port Carbon	4,540 11
" Pottsville	1,842 14
" Schuylkill Haven	35,976 01
" Pine Grove	6,640 00
" Tamaqua	10,982 00
" Harrisburg	
" Dauphin	6,683 09
Total	114,311 01

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	12,157 01
" Mill Creek "	2,721 11
" Schuylkill Valley Scales	1,087 14
" Mt. Carbon "	2,582 02
" Cressona "	17,534 18
" Pine Grove "	
" Tamaqua "	2,689 12
Total	38,773 04

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	2,242 09
" Shamokin	3,639 18
" Herndon	
Total	5,882 07

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,414 02
" Lebanon & Pine Grove Branch	1,678 15
Total	3,092 17

CONSUMED ON LATERALS.

From Frackville Scales	763 06
" Mill Creek "	132 19
" Schuylkill Valley Scales	500 13
" Mt. Carbon "	1,154 12
" Cressona "	161 06
" Pine Grove "	76 19
" Tamaqua "	146 14
Total	2,941 11

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a Br.	96 05
" " Alburtis, " "	30 16
" " Oreland, G. & N. Br.	900 08
" " Connecting R. R.	
" " Willow Street R. R.	247 11
Total	1,275 00

BITUMINOUS.

From Harrisburg	8,791 12
" Connecting R. R., G. & N. Br.	
" Junction R. R.	
Total	8,791 12

COAL FOR COMPANY'S USE.

Anthracite	2,858 15
Bituminous	992 02
Total.	3,150 17

RECAPITULATION.

	Total for Week.	Corresponding week last Year.	
Passing over Main Line and Leb. Val Branch	114.311 01	44,094 12	i 70,216 09
For Shipment by Canal	38,773 04	6,266 12	i 32,506 12
Shipped Westward via Northern Central R. R.	5,882 07	6,055 09	d 173 02
Shipped West or South from Pine Grove	3,092 17	207 02	i 2,885 15
Consumed on Laterals	2,941 11	1,401 03	i 1,540 08
Lehigh and Wyoming Coal	1,275 00	5,627 01	d 4,352 01
Total Anthracite paying fr'gt	166,276 00	63,651 19	i 102624 01
Bituminous	8,791 12	10,145 19	d 1,354 07
Total of all kinds paying fr'gt	175,067 12	73,797 18	i 101269 14
Coal for Company's use	3,150 17	4,317 05	d 1166 08
Total Tonnage for Week	178,218 09	78,115 03	i 100103 06
Since Dec. 1, 1870	2.960818 13	1942863 14	i1017954 19
Total to date	3,139037 02	2020978 17	i1118058 05

SHIPPED BY CANAL.

	Total for Week.	Corresponding week last Year.	
From Schuylkill Haven	39,945 09	5,773 00	i 34,172 09
" Port Clinton	3,215 00	174 00	i 3,041 00
Total Tonnage per Week	43,160 09	5 947 00	i 37,213 09
Since Dec. 1, 1870	422,618 14	95,394 09	i 327224 05
Total to date	465,779 03	101,341 09	i 364437 14

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad during the week ending Saturday, July 29, 1871:

	tons. cwt.
From St. Clair	38,646 06
" Port Carbon	4,540 11
" Pottsville	1,842 14
" Schuylkill Haven	35,976 01
" Auburn	9,813 17
" Port Clinton	19,982 00
" Allentown and Alburtis	127 01
" Harrisburgh and Dauphin	15.475 00
Total paying freight	126,403 10
Coal for Company's use	3,150 12
Total for week	129.554 01
Previously this year	2,240.372 10
Total	2,369,926 11
To same time last year	1,722,062 18

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending July 29, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	27.694 05	256,437 09	23,100 04	645,791 14
" Canal	600 17	5,307 05	718 05	9,796 03
Total	28 295 02	261,744 14	23,818 09	655,587 17

Decrease 1871, 393,843 16 tons.

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for week ending July 29, 1871, previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt
Total Wyoming	15,013 03	269,659 01
" Hazleton	53,392 00	447,047 12
" Upper Lehigh	40 06	795 12
" Beaver Meadow	22,898 03	153,258 09
" Mahanoy	12,662 16	306 886 10
" Mauch Chunk	125 11	6,256 18
" Sullivan & Erie		173 05
Total Anthracite	104,152 01	1,183,077 07
Bituminous Coal from all sources	8,550 00	230,293 00
Total by rail and canal	112,702 01	1,413,370 07
Same time last year	87,176 13	2,271,251 12
Increase	25,525 08	
Decrease		857,881 05
Forwarded East from Mauch Chunk by rail	78,087 08	960,319 00
Same time last year	61,293 10	1,827,825 02
Increase	16,793 18	
Decrease		867,506 02

RECAPITULATION.

Forwarded East from Mauch Chunk by rail	78,087 08	960,319 00
To N. C. R. R., at Mount Carmel		2,967 13
Forwarded North from L. & B. Junction	10,751 17	115,913 02
To L. & S. R. R. at Packerton for rail	153 14	3,523 09
Delivered at M'h Chunk	6 00	541 02
Delivered on line of road above Mauch Chunk	20 10	5,832 05
Delivered above MauchChunk for use of L. V. R.R.	942 08	28,870 13
To L. & S. R. R., at Penn Hav., for railroad		94 10
Do. for canal	10,165 07	46 329 08
At M.Chunk for canal	4,024 17	18,686 05
Total Anthracite	104.152 01	1,183,077 07
Bituminous Coal	8,550 00	230,293 00
Total all kinds	112,702 01	1,413,370 07

This report includes all Bituminous Coal carried over the Lehigh Valley and P. & N. Y. Railroads from December 1st, 1870, to date.

Delaware and Hudson Canal Company.

The following is a statement of Coal transported by the Delaware and Hudson Canal Co., for the week ending July 29, 1871.

	WEEK.	SEASON.
By Delaware and Hud. Canal	36 691 00	355,939 00
By Railroad East	10,330 00	141,369 C0
" West	4,711 00	40,250 00
" South	11,307 00	126,788 00
TOTAL TONS,	63,039 00	663,846 00
For the same period last year.		
By Delaware and Hudson Canal	53,710 00	833,369 00
By Railroad East	6153 00	272,795 00
" West	2422 00	46,803 00
" South	10502 00	258,415 00
TOTAL TONS,	72,787 00	1,361,382 00

Huntington and Broad Top R. R. Co.

For week ending July 29, 1871	5,384 tons.
Same time last year	7,452 "
Increase	
Decrease	2,068 "
Total amount shipped to date	207,285 "
Same time last year	179,848 "
Increase	27,437 "
Decrease	

Delaware, Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna and Western R. R. for week ending July 29, 1871.

	Week. Tons. Cwt.	Year. Tons. Cwt.
Shipped North	18,391 05	168 824 07
Shipped South	41,872 13	411,807 02
Total	60,263 18	580 631 09
For the corresponding time last year:		
Shipped North	21.730 18	408,644 18
Shipped South	33,819 09	1.024,670 11
Total	55.550 07	1,433,315 09
Increase	4,713 11	
Decrease		852,685 00

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Campany for the week ending Saturday, July 29, 1871.

	WEEK.	SEASON.
North	55,251 12	501,828 07
South	11,906 19	126,287 19
Total	67,158 11	628,116 06
Corresponding time in 1870:		
North	46.943 05	1,306,554 15
South	10,502 07	258,415 01
Total	57,445 12	1,564,969 17
Increase North		
Decrease South		
Total decrease		936,853 10

Shamokin Coal Trade.

For week ending July 29, 1871	19,775 05
Same time last year	19,620 08
Increase	154 17
Decrease	
Total amount shipped to date	361,334 06
Same time last year	226,151 19
Increase	135,182 07
Decrease	

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday July 22, and during the year 1871, compared with the corresponding period of 1870.

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R. R. C. Tons. Cwt	Total. Tons Cwt.
1871	10,181 08	22.394 02	32,575 10
1870	9,499 02	13,867 01	23,366 03
Increase	682 06	8,527 01	9,209 07
Decrease			

YEAR.

1871	369,025 04	704,788 10	1,073,813 1
1870	283,430 06	475,315 06	758,775 1
Increase	85,594 18	229,443 04	315,038 02
Decrease			

Cumberland Branch

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons Cwt.	Total. Tons. Cwt.
1871	4,416 18	992 15	5,409 13
1870	1,175 14	1,946 15	3,122 09
Increase	3,241 04		2,287 04
Decrease		954 00	

YEAR.

1871	105,061 13	43,425 68	148,477 01
1870	53,334 12	57,388 14	110,753 06
Increase	51,687 01		37,723 15
Decrease		13,963.06	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, July 22. R. A.	W. A.	AT PHILADELPHIA, July 23. R. A.	W. A.
SCHUYLKILL.				
Lump	$ —	$ —	5 50	— 4 50
Steamer	6 00	—	—	— 4 50
Broken	6 00	—	—	— to 4 75
Egg	6 25	—	—	— to 4 75
Stove	6 50	—	—	— to 5 00
Chestnut	5 75	—	—	— to 4 25
Pea	—	—	—	—
LEHIGH.				
Lump, (along side)	6 75	—	—	—
Broken	6 10	—	—	—
Egg	6 00	—	—	—
Stove	6 10	—	—	—
Chestnut	5 50	—	—	—
Pea	—	—	—	—
SPECIAL COALS.*				
Diamond Vein	R. A. 5 50@7 00		—	—
New England	"	—	—	—
Locust Mountain	W. A.	6 50	—	—
Honey Brook, Leh'h	W. A.	5 00@6 25	—	—
Spring Mountain	" "	5 00@6 25	—	—
Sugar Creek	" "	5 00@6 25	—	—
Sugar Loaf	" "	5 00@6 25	—	—
Old Comp'y's	" "	5 00@6 25	—	—
Cross Creek	" "	5 00@6 25	—	—
Room Run	" "	5 00@6 25	—	—
Girardville	" "	—	—	—
McMichael	" "	—	—	—
Shamokin	" "	5 25	—	—
Lykens Valley	" "	5 75	—	—
Broad Top	" "	5 25	—	—
Hill & Harris	" "	5 25	—	—
Henry Clay	" "	—	—	—
Powelton	" "	5 25	—	—

*Dealers in these coals may be found in our advertising columns.

Line Prices for Coal August, 1871,

	Lump	Broken	Egg	Stove	Ches't
At Mauch Chunk	4.50	4.00	4 00	4.25	3.50
" Wilkesbarre	3 75	3.75	3.75	4.00	3.25

Company Coals.

August, 1871.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton E. Port	4 80	4 90	5 10	5 50	5 75	4 75
*Pittston at Newburgh	4 80	4 80	5 00	5 10	5 40	4 60
*Lackawana at Rond't	4 70	4 90	5 15	5 40	5 75	4 85
Wilk'b're at Hoboken	4 65	4 65	5 00	5 25	5 75	4 75
Old Co. Lehigh at Pt John'n	6 25	— —	5 65	5 50	6 00	5 00
Lehigh at Eliz. Port	6 25	— —	5 65	5 50	6 00	5 00

For freights to different points see "Freights"
* To contractors.

Prices at Baltimore—August, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 25@5 50
Pittston and Plymouth, do	5 25@5 40
Shamokin Red or White Ash, do	5 25@5 40
Lykens Valley Red Ash, do	— —@5 80
Zerba Valley	— —@— —
Treverton	— —@— —
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	— —@4 75
Fairmont and Clarksburg gas, f. c. b. at L. Point	6 00@6 50
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein f.o.b. at Phila	$ —
Lemon " " "	—
Cumberland Vein Coal	—
Consolidation Coal Co.'s on board N. Y.	6 75
Maryland Coal Co. " "	6 75

Prices at Georget'n, D.C., & Alexandria, Va.

August, 1871.

George's Creek and Cumberland f. o. b. for shipping...$4 50@4 60,

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$5 50@5 75
Lykens Valley	6 00@6 25
Shamokin Red or White Ash	5 50@6 00
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

August, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

Duty, $1 25, gold

	Coarse	Slack.
Block House	$1 75	@-1 75
Gowrie	1 75	@-1 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 60	@- 80
Little Glace Bay	1 60	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

	Currency.
AMERICAN.	
Westmoreland	7 10 @7 25
Fairmount Gas Coal Co. of N. Y.	7 50 @- —
Despard Coal Co.	$7 50 @- —
Penn	7 75 @8 00
Newburg Orrel Gas	- — @- —
West Fairmount Gas Coal	8 00 @- —
AT PHILADELPHIA.	
Powelton	$7 75
TO NEW YORK.	
Provincial.	
Sidney	$ —
Lingan	— —
Cow Bay	— —
Port Caledonia	— —
Little Glace Bay	— —
TO BOSTON.	
Sydney	$ —
Lingan	— —
Cow Bay	— —
Port Caledonia	— —
Little Glace Bay	— —

Prices of Foreign Coals.

August, 1871.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, N. Y.

Liverpool Gas Coking	$ 9 00@— —
" " Cannel	11 50@12 50
" House "	— —@16 00
" " Orrel	12 00@14 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@17 50
" Cannel, "	18 00@20 00
Per ton 2,000 lbs. delivered.	

Foreign and Provincial Freights.

August, 1871.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s @15 ton.

Freights.—August, 1871

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Philadelp'a.	Anthracite. From East Port, Port Johnson, and Hoboken.	Anthracite. From Newburg	Anthracite. From Rondout
Amesbury			$2 50	$1 75		
Bangor	$2 75		2 30	1 75		
Bath	2 75	2 65	2 30	1 75		
Boston	2 60	2 60	2 25	2 00	180	1 80
Bridgeport	2 25	2 30	1 80	1 00	1 10	1 25
Bristol		2 60	2 00	1 40		1 55
Cambridgeport			2 75	2 00		
Derby			2 00	1 20		
Dighton	2 30	2 35	2 30	— —		
East Cambridge			2 25	2 00		
Fall River	2 25	2 30	2 25	1 40	1 40	
Hackensack			1 75	90		
Hartford	2 75	3 00	2 30	1 50		
Jersey City		2 00	1 40	50	70	
Middletown			2 25	1 25		
Mystic			— —	1 10		
New Bedford	2 50	2 35	2 00	1 40		
Newburyport	2 75		2 40	1 60		1 35
New Haven	2 25	2 30	1 90	1 00	1 10	2 20
New London	2 25	2 30	1 70	1 15		1 25
Newport			2 00	1 40		1 40
New York	2 00	1 90	1 35	55	70	65
Norwalk		2 30	1 80	1 00	1 10	
Norwich	2 25	2 30	2 00	1 20	1 40	1 50
Pawtucket	2 50	2 50	2 30	1 40		1 65
Portland	2 50	2 60	2 30	1 85		2 00
Portsmouth, N.H	2 75	2 75	1 45	1 80		1 50
Providence	2 25	2 30	2 00	1 40	1 50	
Rockport			2 10			
Saco	2 75		2 25	1 75		
Sag Harbor			1 70	1 20		
Salem	2 60	2 65	2 35	1 80		
Stamford			2 00	1 00	1 10	
Stonington			2 00	1 25	1 20	1 40
Taunton			2 30	1 50		
Warren			— —	1 30		
Washington			1 25			
TO RIVER PORTS.						
Albany		60			55	
Catskill		70			50	
Cocksackie		70			50	
Coeyman's		70			65	
Cold Spring	2 20	70			30	
Fishkill		70	1 60		30	
Haverstraw					60	
Hudson	2 20	2 25			40	
New York					60	
Nyack			1 75		30	
Poughkeepsie					30	
Rhinebeck						
Rondout					75	
Saugerties			1 60		40	
Sing Sing					75	
Stuyvesant					75	
Tarrytown					75	
Troy					55	
West Point			1 75			
Yonkers					60	

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption	$1 95
For reshipment	1 85

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 84
C. R. R., N. J., Phillipsburgh to Elizabethport	2 15
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 44

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 84
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 25
Shipping expenses	25
Wharfage	10
Total	$2 44

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Phillipsburgh	$ 84
Morris & Essex R. R. Phillipsburgh to Hoboken	1 45
Shipping expenses	25
Warfage	10
Total	$2 6

TO SOUTH AMBOY.

L. V. R. R.	84
R. & D. R. R. / Cam. & Am. R. R.	1 15
Shipping Expenses	25
Total	$2 24

PENN HAVEN TO ELIZABETHPORT.

L. V. R R Penn Haven to Phillipsburgh	99
C. RR. of N. J. Phillipsburgh to Elizabethport	125
Shipping expenses	25
Wharfage	10
Total	$ 2 59

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	Toll..$1.25	Freight.,90c.		$2 15
" Port Carbon				
" Port Clinton	" 1.17	" 8 c.		2 02

TO NEW YORK.

From Schuylkill Haven	Toll..1 25	Freight..$1 90..	$3 10

The Rates of Toll on Lump and Steamer Coal will be ten per cent less than the above rates. The charge will be per ton of 2240 lbs. No charge less than Forty Cents per ton will be made for any distance. A drawback of thirty cents is allowed on all coal passing Fairmount Locks used at Philadelphia and vicinity.

Via Lehigh Canal.

TO PHILADELPHIA

Lehigh Canal	$ 80
Freight and towage	1 10
Total	$1 90

TO NEW YORK.

Lehigh Canal	$1 50
Morris Canal / Freight / Towing	221
Total	$

TO JERSEY CITY.

Lehigh Canal	$ 50
Morris Canal / Freight	2 09
For re-shipment	2 59

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 50
Delaware Division Canal	30
Delaware and Raritan Canal	46
Freight	1 05
Towage	20
Total	$2 51

TO NEW BRUNSWICK.

Lehigh Canal	$ 50
Delaware Division Canal	30
Delaware and Raritan Canal	46
Freight	1 05
Total	$2 31

MARKET REVIEW.

FOR THE WEEK ENDING AUGUST 5, 1871.

IRON.—There has been an improved demand for Scotch Pig, but the inquiry is still principally for small parcels; prices, however, are steady at the advance noted in our last. The sales are 585 tons Glengarnock, in lots, part at $33; 340 do. Gartsherrie, $33@$34; and 130 do. Coltness, $35 50, and $31, gold. There continues quite an active inquiry for American, and prices are firm at our quotations—sales have been made of 200 tons No. 1 Poughkeepsie at $35, and 2,500 do. Lehigh brands, for season delivery, including December, on private terms. New Rails continue in request, and we notice sales of 1,500 tons, 56-lb., English, part to arrive, on private terms. Refined Bar continues without movement or improvement, and though all parties seem desirous of an advance, they are not quite agreed to make it at once.

LEAD.—Pig remains dull; 50 tons Spanish sold at $6 12½, gold. Bar, 9¼c.; Sheet and Pipe, 10¼c.; and Tin-lined Pipe, 15c.—usual discount to the Trade.

COPPER.—Manufacturers have made no change in the price of their goods for several months, and the market is steady at our quotations. Ingot continues in request, though not so active as last week; prices for immediate delivery are again one-eighth of a cent. ₱ lb. higher, and still harder; sales have been made of 350,000 lb. Lake Superior at 22¼c.@22½c. for immediate, and 22¾c. for forward delivery.

SPELTER.—There is more business, and we notice sales of 75 tons ordinary Silesian at $5.87½, and 25 do. in lots, $6 gold. 10 tons Missouri Zinc Co., selected, sold at 9c. currency.

STEEL.—There is no change in store prices—market quiet.

TIN.—The demand for Pig at the advanced rates is less active, but prices are sustained, and in some instances are rather higher; sales have been made of 800 slabs Straits, on a basis of 36 cents; 300 do., 36 @ 36¼; and 35 tons English, 35¼@35½, all gold. Banca is scarce and firm at 41 cents. Plates continue in pretty good demand at full prices—$8.75 is offered for fair brands Assorted Charcoal Tin. The transactions embrace 500 bxs. Assorted Charcoal Tin at $8,75; 2200 do. Coke Tin, 14 by 20, $8 @8.12½; 300 do, 10 by 14, $8; 1400 do. Charcoal Terne, including 200 to arrive, $8.25; and 800 do. $8.25 @ 8.31, all gold.

ZINC.—Sheet is steady and firm, with sales of No. 9 Mosselmann from store, at 9 cents currency; 7¾ cents less 4 per cent. gold is still the agents' price. American Oxide, 6½@7; French, 9½@10½. Manganese, 4½@5.

METALS.

NEW YORK, Aug. 2, 1871.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1¼ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, $7 ₱ ton; Polished Sheet, 3 cts. ₱ lb; Galvanized 2½; Scrap Cast, $6; Wrought, $8 per ton.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	31 00@36 00
Pig, American, No. 1	35 00@36 00
Pig, American, No. 2	33 00@34 00
Pig, American, Forge	31 00@32 00
Bar Refined, English and American	73 00@74 00
Bar Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash.
Bar, Swedes, ord'y sizes	105 00@115 00
Bar, Refined, ord'y sizes	75 00@ — —
Bar, Refined, ¼ @ 5-16 inch	82 50@ — —
Bar, Common	70 00@ 72 50
Scroll	95 00@125 00
Ovals and half-round	95 00@120 00
Band	90 00@ 95 —
Horse Shoe	95 00@100 00
Rods, ⅜ to 3-16 inch	82 50@120—
Hoop	100 00@140 00
Nail rod	— —@6¾ —
Sheet, Russia, as to assortment (gold)	— —@12¾
Sheet, Single, D. and T. Common	—4½@— 5¾
Sheet, D. and T. Charcoal	—5½@—6½
Sheet, Galv'd, Nos. 14 to 26 30 ct. dis.	12@14c ₱
" Nos. 27, 28, and 29 30 ct. dis.	15@18c ₱
Rails, English (gold), ₱ ton	— — @57 00
Rails, American, at Works in Pa	59 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 3½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 12 @— 14
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery, do.	— 10 @— 11
American German, do.	— 9 @— 11

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	36 @— 38
Copper, Old Sheathing, &c. mixed lots	— @— 19
Copper, old, for chemical purposes, 14@16 oz	20 @— 21
Copper, American Ingot	— @— 22
Yellow Metal, New Sheathing & Bronze	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty; Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¾ cents ₱ lb.

Galena, ₱ 100 lbs	$— — @— —
Spanish (gold)	6 12½@6 15
German, do.	6 12½@6 15
English, do.	6 15 @6 50
Bar (net)	9 25 @ —
Pipe (net)	— — @10 25
Sheet	— — @10 25

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ₱ lb.

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (god) p. 100 lb.	5 75 @ 6 12½
Plates, Domestic p. lb.	— 7 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent.; Roofing 25. ad val.

	Gold ₱ lb.
Banca	40½@41
Straits	36 @36½
English	35¼@35½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ₱ box	$8 75 @9 00	$10 25 @10 75
I.C. Coke	7 50 @8 50	9 00 @10 00
Coke Terne	6 25 @7 50	7 25 @ 9.00
Charcoal Terne	8 00 @8 50	9 50 @ 10 00

ZINC—Duty: Pig or Block, $1 50 ₱ 100 lb.; Sheet, 2¼cts. ₱ lb.

Sheet, No. 9 Foreign ₱ lb.— @— — 9

Mining Stocks.

NEW YORK, August 2, 1871.

The market in gold stocks is stronger, and quite active. Sales of 100 shares of Central, gold, were made this A. M. at 6, and in the afternoon session 200 more were sold at the same figure—those sales completing the transactions of the Board for the day, and, considering the very few members present at either session, and judging from the recent meagre operations of the Board, the amount of to-day's business is considerably above the average. The report in full is as follows:

GOLD STOCKS.

	BID.	ASKED.
American Flag	10	21
Bates & Baxter	25	35
Benton	—	10
Black Hawk	—	—
Central Gold	5	—
Cons Gregory	30	—
Grass Valley	7	—
Gunnell	15	—
Holman	—	—
La Crosse	19	25
Liberty	—	—
Mariposa prf	—	—
Montana	—	—
Rocky Mount	—	5
Quartz Hill	—	30
Smith & Parmlee	25	40
N. Y. & Eldorado	—	15

With but very few exceptions Petroleum has advanced, according to the quotations of the Mining Stock Board. No sales have transpired during the week. The following is the report in full:

PETROLEUM STOCKS.

	BID.	ASKED.
Bennehoff Run	20	—
Bergen Coal and Oil	—	—
Bliven Oil	25	—
Blood Farm	—	—
Breevoort	30	—
Buchanan Farm	40	—
Central	60	65
Clinton	—	—
Home	155	—
National	—	—
New York & Allegheny	75	—
Northern Light	50	—
Phillips Pet	—	15
Pithole Creek	97	100
Rathbone Oil	20	21
Rynd Farm	35	—
Second National	—	40
Sherman & B	—	—
Tarr Farm	—	—
United Petroleum Farms	28	31
United States	11	70
Hoffman	—	20

San Francisco Stock Market.

"By Telegraph."

The report of the San Francisco Mining Stock Board is dated, California, August 1st. Without exception all stocks on the Comstock list are weaker, and moderately inactive, unquestionably the result of the recent mining difficulties. As they have been amicably settled and confidence restored, we shall probably record in our next report the market stronger and active. The report of the Board is as follows:

Savage	39
Yellow Jacket	46½
Kentuck	No sales
Chollar Potosi	32
Gould & Curry	113
Belcher	230
Imperial	No Sales
Amador	1285
Crown Point	No Sales
Hale & Norcross	—

Weekly Slate Trade Report—Hydeville.

ROOFING SLATE.

Week ending July 29, 1871.

NAME OF COMPANY.	WEEK.	PREVIOUSLY.	TOTAL FOR YEAR.
Eagle Slate Co	200	3045	3245
Western Vermont Slate Co.	....	314	314
Blue Slate Co	120	1510	1630
The Evergreen Slate Co	240	2989	3229
Forest Mining Slate Co	....	444	444
West Castleton Slate Co	....	....	....
E. D. Billings	....	859	859
R. M. Copeland	....	404	404

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N. Y., via the R. & S. R. R., for the week ending July 31 and for the year 1871.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
†Penrhyn Slate Co	35	3085	3125
New York / *and Middle Granville Slate Co.	55	2895	2950
†American Slate Co	....	....	....
Benj. Williams	35	945	980
Jones & Williams	30	90	120
Eagle Slate Co	....	270	270
Mettowee Slate Co	....	570	570
Albany Slate Co	....	375	375
H. W. Hughes	....	....	....
Total	....	....	....

MILL STOCK, MANTLES, &c.

NO. OF CASES SHIPPED BY	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	11	2788	2799

BLACK BOARDS.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	....	....	....

MILL STOCK, &c.

NO. OF CARS SHIPPED BY,	WEEK.	PREV'S.	YEAR.
Eagle Slate Co	3	22	25
Penrhyn Slate Co	....	....	....

* Sales made together this season.
† Consolidated Sales.

U. S. PATENT OFFICE,
WASHINGTON, D. C. June 26, 1871.

On the petition of J. D. WEST of East Orange, New Jersey, praying for the extension of a patent granted to him on the 29th day of September, 1857, for an improvement in pumps. It is ordered that the testimony in the case be closed on the 29th day of August next, that the time for filing arguments and the Examiner's report be limited to the 8th day of September next, and that said petition be heard on the 13th day of September next.

Any person may oppose this extension.

M. D. LEGGETT, Commissioner.

U. S. PATENT OFFICE,
WASHINGTON, D. C. July 15, 1871

On the petition of DELOS W. GITCHELL of Newburgh, New York, and LUTHER W. BADGER of Elizabeth, New Jersey, praying for the extension of a patent granted to them on the 20th day of October, 1857, for an improvement in manufacturing Seamless Felt Garments. It is ordered that the testimony in the case be closed on the 19th day of September next, that the time for filing arguments and the Examiner's report be limited to the 29th day of September next, and that said petition be heard on the 4th day of October next.

Any person may oppose this extension.

M. D. LEGGETT, Commissioner.

U. S. PATENT OFFICE.
WASHINGTON, D. C. June 23, 1871.

On the petition of WILLIAM PLUMER of Boston, Mass., praying for the extension of a patent granted to him on the 5th day of October, 1857, for an improvement in Rock Cutting and Drilling Machines. It is ordered that the testimony in the case be closed on the 5th day of September next, that the time for filing arguments and the Examiner's report be limited o the 15th day of September next, and that said petition be heard on the 20th day of September next.

Any person may oppose this extension.

M. D. LEGGETT, Commissioner.

DEPARTMENT OF POPULAR SCIENCE.

Darwin's Hypothesis of the Origin of Species.

I.

THE object of this series of articles is to give in simple words an account of Darwin's Hypothesis of the Origin of Species. Let me say, at the outset, that I do not intend to defend or oppose this hypothesis, but merely to state it. Whether it is to be accepted or rejected, there is no doubt that it has occupied for eleven years a central position in the investigations and discussions of naturalists, that it has exercised a commanding influence upon the scientific thought of the present generation, and that it is a subject concerning which persons of general intelligence and culture ought to be better informed than they are. Of course, it cannot be thoroughly discussed within the limits of a popular journal; I shall be content if, after perusing these articles upon it, you will have gained a tolerably clear notion of its nature and scope, and of the sort of evidence adduced in its favor.

The words of my subject suggest at once four important preliminary questions: Who is DARWIN? What is a Hypothesis? What is meant in this connection by Species? and what by Origin of Species?

Mr. CHARLES DARWIN is an eminent naturalist of England, who accompanied, more than thirty years ago, the celebrated expedition of H. M. S. Beagle, and, after his return, published several works on the natural history of the expedition, which attracted much attention from the scientific world. The latest of these, a volume on Cirripedes or Barnacles, was issued, I believe, in 1844 or 1845, after which the general public heard little of Mr. DARWIN, though he was known as an active and laborious investigator, until 1859. During this long interval, however, he was steadily accumulating facts and materials for his great work, the mere preliminary abridgement of which has profoundly agitated the educated world. The fame which now rewards this silent, patient worker, is ample recompense for toilsome years. Though the earnest student of Nature needs no such inducement, yet even the ambitious may learn from this example that the greatest success is achieved by those who do thoroughly what they undertake to do at all. Mr. DARWIN's hypothesis, when it finally appeared, was carefully stated and guarded; its author was prepared to defend it with a vast array of recorded facts; he had considered in advance almost every serious objection that could be immediately urged against it; and he had arranged the whole subject with so much learning, candor and ingenuity, that a large portion of the scientific world were favorably affected at once, and even the adversaries of the new doctrine could do little more than pick flaws here and there in the systematic argument thus suddenly set up before them. The debate which has raged for years over it has been a struggle between those who were prejudiced at once in its favor, and those who were prejudiced already against it. Another DARWIN has not yet arisen against DARWIN; and, quite aside from the truth or falsity of his hypothesis, the modest manner, vailing the giant strength and long-trained skill of the author, has distinguished him throughout above the crowd of both his friends and his foes.

A hypothesis may be defined as something imagined or assumed, to account for known facts or phenomena. It is not a speculation, nor a theory. We speculate in the absence of ascertained facts, as, for instance, concerning the possible inhabitants of the moon, or the ultimate constitution of matter. The deductive method of reasoning, by which all solid progress in science has been attained, comprises four stages: first, the collection of facts; second, direct induction from these; third, ratiocination; and fourth, verification. Thus, it was proved by innumerable observations that all bodies suspended in our atmosphere fall, when set free, to the earth; induction erected these observed facts into a law, the nature and extent of which was unknown; reasoning upon this law, the mathematical principle of it was discovered; and finally, by a recomparison with all the facts, including those of astronomy, the universality of the law of gravitation was verified.

It is in the third stage of this deductive method that hypotheses become useful. Only after they are fully developed and systematized are they theories. I will add that it is not necessary to the usefulness of a hypothesis, that it be true. It is useful, so long as it accounts for all the facts. Whenever a fact is observed quite inconsistent with the hypothesis, the latter must be modified or rejected. Thus on rising in the morning, you find the air out-doors obscured with haze. Looking out of all the windows, you find that it surrounds the house. It occurs to you that this is a fog; and the hypothesis accounts for the facts so far. For many purposes it is just as good as if it were true. As long as you stay in the house the world without is practically foggy. But when you open the door a smell salutes your nostrils, which is not accounted for by the hypothesis of a fog. You instantly substitute the hypothesis of a fire, and reasoning from the direction of the wind, you say there must be a fire in a certain quarter. Walking forth, you discover the smouldering heap, and thus verify the hypothesis.

The term species, as employed here, refers to the organic world, that is, to plants and animals alone. There are mineral species likewise; but their origin is not included except by the most fanciful analogy in the Darwinian hypothesis.

To the question, what is a species? it is not possible to give a scientifically precise answer. Naturalists have always differed more or less about it; and Mr. DARWIN's views tend to destroy even the vague agreement which now exists.

The organic world is divided into two kingdoms, the Animal and the Vegetable. The animal kingdom is divided into branches or types, classes, orders, families, genera, species and individuals. Thus, there are four branches or types, the Vertebrates, Articulates, Mollusks and Radiates. Beasts, birds, reptiles, frogs and fishes are vertebrates; insects, lobsters and worms are articulates; nautilus, snails and oysters are mollusks; and star-fishes, jelly-fishes and polyps are radiates. Now each of the familiar illustrations I have given represents a class. Thus we have in the branch of Vertebrates the classes of mammalia, birds, reptiles, frogs and fishes; in the branch of Articulates, insects, lobsters and worms, and so on. But each class is again divided into orders. Thus the class of mammals comprises the order of Bimana, or Men; Quadrumana, or Monkeys; Cheiroptera, or Bats; Carnivora, or flesh-eaters, and many others.

Again, each order is divided into families; thus, the order of Carnivora includes the Cat family, the Dog family, the Bear family, and several others.

Families comprise genera; thus, we have in the Cat family the genus *Felis* or true cats, and the *Lynx* genus.

Finally, genera comprise species; thus the genus *Felis* contains the species lion, tiger, panther, leopard and common cat. The American wild-cat belongs to the Lynx genus.

The vegetable kingdom is subdivided in a somewhat similar manner.

Now the arrangement of facts or objects in a system may be merely arbitrary, for the purposes of convenience, as we pigeon-hole letters in the post-office alphabetically. Mr. SAMUEL WELLER's letter goes under W; but if he spells it "with a We," it goes under V. In either case, the nature of the letter, its subject or its language, has nothing to do with its classification. So LINNEUS, in classifying plants, arranged them according to the numbers of their petals, stamens and pistils, which are in many cases variable or non-essential. But it is held that the divisions I have enumerated, and those of the so-called natural systems of Botany, are not wholly the contrivance of man, but exist in nature. According to AGASSIZ branches are characterized by plan of structure; classes by the manner in which that plan is executed, as far as ways and means are concerned; orders, by the complication of the structure; families by form; genera, by details of execution in special parts; and species by the relation of individuals to one another, and to the world in which they live, as well as by the proportion of their parts; their ornamentation, etc.

R. W. R.

New Publications.

THE ANNUAL REPORT OF THE STATE ENGINEER AND SURVEYOR OF THE STATE OF NEW YORK, and of the Tabulations and Deductions from the Reports of the Railroad Corporations for the Year ending September 30th, 1870. Albany: The Argus Company. 1871.

THIS report contains much valuable information concerning the railways of the State. The main feature of the book is the large number of tables giving the results from the reports of the various companies. It embraces almost all that is valuable in all the separate reports giving the lengths of the roads, number of passengers carried, number of miles travelled by passengers, or the number of passengers carried one mile, number of tons of freight carried, average speed of passenger trains, including stops, rate of speed when in motion, weight of trains, etc. Horse-railroads also come within the scope of the report, rendering it very complete.

ANNUAL REPORT OF THE STATE ENGINEER AND SURVEYOR ON THE CANALS OF NEW YORK, for the Year 1870. Transmitted to the Legislature January 13th, 1871. Albany: The Argus Company Printers. 1871.

THIS report is illustrated with a number of large lithographs explanatory of the text, and gives a complete statement of the condition of the canals of the State, and various recommendations for improving their efficiency. The chapter on the application of steam for canal navigation is brief, but pointed. Mr. RICHMOND recommends the appointment of a competent engineer to make plans and superintend the construction of one boat, on the most approved plan, and to put to a practical test, as soon as possible, the project of the employment of steam as a motive power.

WE have also received the annual reports of the Chollar-Potosi and of the Savage Mining Companies, giving full data regarding the working of these mines up to a recent date.

A Nevada Mining Enterprise.

WE would direct the attention of our readers to a card in our advertising columns of some gentlemen who have been favorably known by us, and who are desirous of obtaining capital for a bona-fide mining operation. They own what they consider a very valuable mine, and wish to erect a mill to treat their ores. There is no watered stock, and no gentleman interested who wants a situation without practical knowledge of the business.

Consumption of Silver in New York.

THE sales of silver in New York, for consumption by manufacturers of silverware, including bars of refined and Mexican dollars, are said to aggregate $5,000,000 annually. Including the consumption of precious metals by manufacturing jewellers of all sorts, this aggregate is increased several fold, the estimate of New York being alone $15,000,000—that is to say, $5,000,000 in silver and $10,000,000 in gold; and this is exclusive of what is known as "rolled stock," or ribbons. The fact is asserted that there is more silver used for domestic purposes in the United States than any other country in the world.

The Fastest Time in the World.

THE London *Morning News*, in an article entitled "The Fastest Time in the World," says: "The new express train from Plymouth to London will probably be the fastest train in the world in the part of its journey which lies over the Bristol and Exeter and Great Western Railways. Leaving Exeter at 10:30, it is timed to reach Paddington at 2:45, including a stoppage of five minutes at Bristol, and the inevitable and vexatious ten minutes at Swindon, the journey of 194 miles will occupy 4¼ hours."

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
WILLARD P. WARD, M. E.,
Editors.

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The New York Railway.

IN the New York *Times* of July 26th there was published an exceedingly long communication from a correspondent with reference to the Viaduct Railway. Some of the inconsistencies of this article are so glaring that even the superficial reader could scarcely overlook them. For example, the author quotes the definitions of a viaduct given by WEBSTER and WORCESTER, and concludes that it is not possible to erect a viaduct railway in New York south of One Hundredth street. He contends that the term viaduct can only be applied to a structure for carrying a road over low ground, and since the ground on which our city stands is high, it is not possible to build a viaduct upon it.

The gentleman then goes into a long argument, and adduces figures and statements to show that in London, where viaducts have been used for years, they are unsuccessful as a means of city transit, and hence he argues that a viaduct railroad, which, according to his own showing, cannot possibly be built, will prove unremunerative in this city. He might as well argue that because balloons were successfully employed during the siege of Paris, an underground railway in New York would be unsuccessful.

The author also virtually confesses that the viaducts in London have not been run for the purpose of carrying passengers from one point in the city to another, like the underground railway, but were originally built so that passengers coming to London could be brought to a station situated within a moderate distance of the hotels and the fashionable quarters of the city. It does not require much reflection to see that unless a railway company cultivates a traffic it will not get it. If trains stopping at suitable stations are not provided, local passengers will naturally seek another method of conveyance.

We say that the author confesses this. He does not say so in so many words; but when he says, "It is not meant that there are no possible means of access to the railways on these viaducts," we certainly are warranted in the assumption that the roads are not especially easy of access; and when he says that the residents within a quarter of a mile of the two or three stations which do exist, are, perhaps, unacquainted with the number of trains, or when they stop at these stations, we conclude that the company have taken but little pains to inform them, and, further, that the viaduct system cannot be such an unmitigated nuisance as the author claims, or they would be painfully conscious of both the number of trains and their time of stopping.

The *Times* correspondent is also guilty of the following remark: "But it is wholly unnecessary to go to London to show that some kind of device for getting locomotives and trains through the city, no matter what, and, above all, the very worst—that of a viaduct railway—which has ever been discovered and used, will not command or accommodate local city travel. New York had locomotives running for years way down to Centre street and to Chambers street, and at a good round speed, a great deal better situated than if on a viaduct, and no such result as local conveyance followed. Ever since and now locomotives are running, for more than half of the city's length, yet there is no city traffic with them."

The total irrelevancy of this is apparent, when we consider that even if, for the sake of argument, we admit the practicability of running locomotives through our crowded streets, we certainly know that the trains which thus passed through the city, made no stop, and it was not possible for local passengers to use them. So far as city transit is concerned, such trains might as well never have existed, and we cannot help thinking that the London viaduct lines are in the same condition.

Such arguments against the New York Railway Company's plan have no force whatever with those who take the trouble to read them; but the article in question is so voluminous that, without reading it at all, one would think that there must be very weighty objections to the viaduct system.

Boiler Explosions.

WHENEVER a boiler explodes in a crowded place, causing loss of life, the attention of the public press is especially attracted to the subject, and our daily papers teem with articles on the various supposed causes of explosions. Each theory is backed by an argument to prove that boiler explosions can originate in no other way.

The recent explosion of the boiler of the ferry-boat "Westfield" has furnished a text for a very large number of editorials, some of which are so preposterous that we feel called upon to say a few words upon the subject.

From a scientific point of view, the killing and wounding of a large number of human beings does not add to the interest of an explosion; and however harrowing the loss of life may be to our feelings, or however much it may frighten us, we should not allow this fact to influence our judgment when we come to analyze the accident.

On the subject of boiler explosions we have some ideas which, though shared by some of the first scientific men in the world, would be considered "old-fogy" by the brilliant writers of the daily, and quasi-scientific press.

We believe, in the first place, that a boiler explodes because there is a higher pressure of steam on the interior than the boiler is capable of withstanding. We see no reason for supposing that any gas, other than steam, is formed. Every boiler should be a law unto itself. It has the strength to resist pressure up to a certain point, and when the boiler is so reduced in strength that it can no longer bear sufficient pressure to perform the work required, it is time to replace it.

In the second place, we believe that boilers seldom explode except under a much higher pressure than they are rated to bear. For example, the boiler of the "Westfield" was considered by the inspector capable of carrying twenty-seven pounds of steam to the inch, we think that we are within bounds when we say that it probably withstood a pressure of over 40 pounds of steam before it exploded. It is true that the boiler was old and had been several times repaired; but the condition of the boiler after the explosion proves conclusively that it was still abundantly able to resist much more than twenty-seven pounds pressure. The braces were torn through the iron shell, which was over a quarter of an inch thick, and in very good condition where the braces were rivetted in. There may have been a defect in some part of the boiler, but if there was, it, in all probability, lessened the loss of life and the danger of the explosion by releasing the steam before the pressure was higher.

We take it for granted that a sufficient pressure of steam can be raised in any boiler to explode it, and the stronger the boiler the more fearful the effects of the explosion.

It is the duty of the engineer, at all times, to be sure that the pressure of steam on the boiler is a safe one. Any boiler can withstand some pressure or other, and it should not be called upon to do more than its strength allows. This is a very simple common-sense view of the matter, but it does not seem to be a favorite one with the press. Evil-minded persons might say that it was too true.

The "Westfield" disaster appears to us to be entirely due to the negligence of those in charge of the boiler. Even if the safety-valve did not work, the engineer should have been at his post, and he could then have easily seen from his steam-gauge that the pressure was altogether too great, and have taken precautionary measures in good time.

The Origin of Electricity in Submarine Cables.

A RECENT number of the *Mechanics' Magazine* contains an interesting article upon this subject, which is intended to bring the matter before the public and provoke discussion. We make the following extracts from the article alluded to, hoping that it may lead to the investigation and discussion of the subject in this country:

Whenever a submarine cable during the process of its manufacture is being tested, it is generally usual to discharge it through a sensitive galvanometer before taking the test, so that if there be any electricity in the wire it may be discharged, in order that the condition of the cable may be as nearly normal as possible. When this operation takes place, a discharge of variable force has almost always been observed.

If a core, covered core, or cable have both its ends insulated, and it be discharged (one end remaining free) through a Thomson's reflecting, or other sensitive, galvanometer, a *positive* current will be noticed going to earth. While the cable is thus to earth a slight permanent *positive* deflection will be observed.

If one end or both ends of the cable be to earth, *no* discharge is perceived, but the permanent current will be at once seen.

The following points are especially noticeable about this discharge:

It has been observed with almost every coil or wire, before testing goes on, varying only in *force*, the sign being always positive.

It is observed at all *temperatures*.

It is always *positive*.

Its *force* increases almost directly according to the *time* the wire remains *insulated*.

It takes a certain definite time to arrive at a maximum.

It is proportional to *length* of wire.

It has been observed in a newly-manufactured coil before having any current in, and before it has been put into water.

It has been observed in uncovered coils, in served and in sheathed cores under all conditions, after being electrified and thoroughly discharged, and after the cable has been for days without a current being passed into it.

When hitherto seen, it has, without the sign of the current being observed, been attributed to "electrification;" but it cannot be due to that, for the following reasons:

The wires, when tested, are operated upon with *negative* currents. So long as the wire remains in an "electrified" condition, it must have been *negative*, and the discharge consequently of a *similar* sign.

This discharge was invariable *positive;* wires have been *negatively* electrified and *positively* electrified; after being thoroughly discharged, a new discharge appeared always of a *positive* sign, increasing in force according to the length of time the ends were left free.

The explanations which have been offered to account for these phenomena are, first, that the core or cable forms an electric element or battery; secondly, that the effects are due to induction, the effect of the negative state of the earth itself; thirdly, that the cause is due to conduction, the atmosphere being in a positive state.

Many experiments have been undertaken to prove the last theory, more especially with condensers, by placing one side of a condenser to earth and freeing the opposite plates. They, after the same period, exhibited positive or negative electricity according as the room was electrified positively or negatively from a large battery; but some experiments with the cable seem to show that some other explanation must be looked for than the above. The case we have mentioned, where the ends of the cable were sealed and accumulation of electricity still went on, is decidedly against this theory.

There is some reason, however, in the first explanation that the effects are due to the core or cable itself forming an element. In the core of a sheathed cable this may be seen in the fact that the copper wire represents the positive element, and the iron wire the negative, separated from each other by the dielectric or gutta-percha, to some extent porous, but so far from being properly porous that but small effects are obtained from such an amount of surface as the copper and iron represent. The space between the metal being always moist, it is easy to see that some electrical action must arise. The electricity, though small, obtained from this source, is accumulated in the core of the cable, and this peculiar battery which at any moment gives but feeble effects, will in the course of time, through the cumulative action of the core itself, give forth instantaneous currents of comparatively great power.

This explanation seems satisfactory as regards sheathed cables or core immersed in metal tanks, but the same effects are seen with a core in the open air. Where then is the negative element?

The remaining explanation is that the various phenomena are due to the inductive action of the earth assumed to be negative. This explanation fully accounts for every phenomena, but then it becomes necessary to assume that the earth possesses negative electricity instead of being *nil*. If we can assume that the effects are due to induction, every phenomena is easily explained, and the inductive action of the earth would readily account for the accumulation in the core as well as in the sheathed cable.

An experiment was performed in a four wire cable which will illustrate the inductive effect of one electrified body upon another not electrified.

The object of the experiment, one out of many, was to observe the effect of the lateral induction in a compound wire cable. One wire of the cable was kept permanently charged with the negative current from a source of ten elements. The wire was, therefore, permanently negative. One of the other wires, insulated at its opposite end, was connected to a well insulated key so that it could be discharged to earth through the galvanometer. The following are noted as the principal results:

The induced charge was *positive*.

The quantity depended upon the *time* the wire was kept insulated.

The quantity was proportional to *length;* this was proved by a similar experiment upon two of the wires representing double the length, so that the induced electricity discharged from both wires might represent the sum of the two.

It will be seen that the result of this experiment showed precisely the same characteristics as the natural discharge of a cable, and indeed similar results were obtained from a submerged cable with its sea end insulated. This cable after being without a test for several days gave, when next tried, a strong positive charge.

MINING SUMMARY.

California.

From the Central City *Register* July 26th.

YIELD OF A CALIFORNIA PLACER.

Mr. W. H. PETTEE, of the California State Geological Survey, makes an estimate regarding the placers of Gold Run District. He estimates that the superficial area of the patch is 860 acres; that about one-half has been worked over, but not worked out, as the bed-rock has been reached at only one extremity; that about 43,000,000 of cubic yards of dirt have been removed by the hydraulic process; and that the gross product of the District, taken from statistics, is $2,000,000. The average yield, therefore, has been but four and a half cents to the cubic yard of earth, and yet hydraulic mining has been carried on to a large profit. In this work only the surface dirt has been removed, there being from one to two hundred feet of gravel and cement underlying the excavation. This is expected to be much richer, and to bring up the average yield, and at the same time put larger profits into the pockets of the operators. The *Scientific Press* says these calculations are probably more reliable than any before made.

This statement should be very suggestive to the hydraulic miners of Colorado. In a cubic yard there are twenty-seven solid feet. In a common wagon-load—a quarter of a cord,—there are thirty-two feet. In this California dirt there was then *five and one-third cents* to the wagon-load, or about twenty one-third cents to the cord. Yet forty-three millions of yards, yielding $2,000,000, have been worked to a profit. The principal cost in this operation, probably, was the water, and there is no doubt that the location in this respect was more favorable than most that could be found in Colorado. But who knows anything about patch diggings in Colorado that contain only twenty or thirty cents per cord. When our miners talk of diggings they report so much to the pan.

We especially call the attention of our miners in Lake, Park and Summit counties to these statements. In their broad and numerous patches, yielding a dozen or twenty times as much per yard, there is room for the most profitable mining enterprises. It needs capital, or what is equivalent, a combination of labor, to bring the water in upon their ground, but the reward is certain.

It also appears to us that there is an opening right at home, in washing the whole slope of the mountain on which the U. P. R., the Kip, the Hunter and others are situated. It is well known that money has been made by shovelling into sluice-boxes there, and even in carting the gravel down the gulch and then sluicing it. Could not one hundred inches be got from the Consolidated Ditch at such a reasonable rate as would admit of parties taking hold of this enterprise. The Ditch Company have heretofore sold their water at too extravagant rates to warrant any such undertaking, and they may do so yet for all we know. But it appears to us that they would rather get $25 per day than nothing. We believe this suggestion is worth looking into at least.

RICH STRIKE.—The Auburn (Placer county) *Herald* of the 15th, says: On Tuesday last, some Swedish boys, JOHNSON & Co., opened a most remarkably rich ledge of quartz, between two and three miles west of here. The claim is located some two hundred yards northwest of the famous St. Patrick mine. There three men had sunk a shaft some fourteen feet when they opened on rock that pays some six or seven dollars to the pound; or, if it holds out, about $12,000 to the ton. At last accounts, two of the men were quarrying the rock and packing it to the cabin where the other was pounding out the gold by the use of a common hand mortar. The discovery has created additional excitement in this rich quartz district. We are under obligations to Mr. G. BARNEY, engineer of the St. Patrick mine, for some of the above facts.

Colorado.

From the Colorado *Miner*, July the 20th: PALMER & NICHOLS have shipped two bars of silver bullion since our last issue, one weighing 636.40 ozs., 830 fine, coin value, $682 92; the other weighing 952.30 ozs., 759 fine, coin value, $934 39, making a total of 1,588.70 ozs., coin value, $1,617 31. They have also purchased several lots of ore, among which we noticed 115 lbs. of slide, assay 390 ozs. to the ton; 2,780 lbs., first class, Gilpin, 110 ozs., 3,048 lbs., second class, 48 oz.; Thompson, slide, 183 lbs., 553 oz.; 1,117 lbs. Willow, second class, 83 ozs. 1,850 lbs. Munsell, 113 ozs.; 9,713 lbs., Roe, assay 122 ozs., and 298 lbs., Indigo, 127 ozs. Repairs are still necessary, which materially reduce the bullion summary.

We visited the La Plata one day last week, and if seeing large deposits of rich ore in a true fissure vein at no great depth from the surface could increase our faith in the resources of the country, then our confidence and faith in the present and future of the prosperous condition of the country was greatly increased. There are from six to eight inches of decomposed vein-matter interspersed with black sulphurets of silver. The whole of the pay-crevice material, as it comes from the mine, yields by mill treatment $247 per ton in coin. G. C. RAMSDALL & J. J. HOUGH are making money by working this mine, and at the same time placing the mine in good working order. The La Plata is a true fissure-vein, with a generous deposit of silver-bearing ore, and will prove its metal in a short time. MESSRS. RAMSDALL & HOUGH have leased the White lode, and will have a good working force on this property in a short time. J. S. EAGAN & D. H. BURNETT are working the Zouave, situated on Republican Mountain, and are obtaining satisfactory results. Ore treated at the Stewart Silver works gave a yield of 268 ozs. and 712 ozs. per ton. When development takes place on this rich vein, the ore-yield, in our opinion, will be large and very profitable.

ADVANCED RATES FOR ORE.

The Stewart Silver Reducing Company, on and after July 1st, are paying advanced prices for all classes of gold and silver ore. We are buying ore as low as forty ounces of silver or fifty-two dollars in value, as well as high-grade ore, both of silver and gold For schedule of prices please apply to J. OSCAR STEWART, Supt.

The *Miner* says: We have to record another important discovery, situated on Republican Mountain, above the La Plata, by DAVID C. LANE, The crevice has a breadth of four feet between walls. The pay-crevice material is composed of gray quartz and decomposed clayey material, that assays $162 coin per ton. We esteem this a very valuable discovery, and hope our young friend LANE will go after his new-found treasure. DAVID LEES is working the Kilwinning, and at a depth of forty feet is taking out ore that yields, by mill treatment, 369 ozs., and 570 ozs. per ton for first-class ore, and 102 ozs. and 150 ozs. for 2d class ore.

SUMMIT COUNTY.

Work, of late, has been recommenced on many lodes that have been idle for a long time. Among the number is the Eagle Bird, now being worked and yielding good ore in fair quantities. An assay of the average crevice material taken out since work has been recommenced gave a yield of $226 per ton. We trust this property will be worked continually, for it is one of the broad guage veins, and will, no doubt, when depth shall have been gained, yield large amounts of good milling ore.

The Santa Fe lode, situated at the head of Gilson gulch, Idaho district, is being worked by R. B. GRISWOLD, and it affords us a great deal of pleasure to state that a good body of paying ore has been reached at no great distance from the surface. The ore is transmitted to HILL'S smelting works, at Black Hawk, Gilpin county, and there sold for from $65 to $160 per ton. An assay made by PALMER & NICHOLS, of this place, of ore taken from the Santa Fe gave a yield of $49.72 in silver and $87.90 in gold, aggregating $137.62 per ton in silver and gold. The vein carries eight inches of solid galena, and the cost of transportation of the ore from the mine to the reduction works is $5.00 per ton.

Stoping has commenced on the Silver Plume and the results are astonishing. A quantity of ore mined out and sent to Swansea, Wales, for treatment, yielded $1,364 per ton. and it is thought by competent judges that the ores now being mined will give a higher yield than that

formerly sent to Swansea. A car load, ten tons, of first class Silver Plume ore will be shipped to Swansea for treatment. Drifting has been going on for some time and yet the ore drifted out has more than paid for all the work done on the mine. Stoping has commenced now and the public may confidently expect large and constant shipments of ore from this mine. Will the rich products of our mines always be sent to our English cousins for treatment, or will reduction works be erected in Colorado to compete with the smelting works now in operation at Swansea, Wales.?

A stupendous enterprise, organized some time since by MASON SHELTON, FRANK A. POPE and JOHN BURKHOLDER, for the purpose of prospecting both slopes, north and south faces of Leavenworth mountain, by boom ditching, has been in operation for some time. MASON SHELTON has been engaged for the past three seasons in constructing the supply ditch, four miles in length, and now, after three years of toil, has demonstrated the fact that energy and pluck, with a little money, wins in mining as well as in all other branches of industry. Five cuts have been made on the north slope of the mountain, in one of which the *debris* has been stripped to the bed-rock and ten lodes laid bare to the gaze and confusion of a certain class of men who always predict failure to any enterprise that they cannot comprehend. Ten good lodes discovered on Leavenworth Mountain! Here is encouragement for the completion of the Helmick Tunnel. Ten lodes to cut on the north slope of Leavenworth Mountain and this tunnel enterprise lying idle. Are the stockholders bulling and bearing each other? The only way to run mining enterprises with profit and success, is to run them where the mines are. The size of the reservoir is 40x10 feet and 4½ feet deep. The discharge box of the reservoir is 32x10 inches. One can only form a faint idea of the force exerted by the water as it rushes down the mountain, carrying vast quantities of earth and rock before and with it. When the work of stripping to the bed-rock is done by water it is well done. Assays of the pay streak taken from two of the lodes on the surface gave the following results: One $622 per ton and another $872 coin per ton. When the bed rock is stripped in all the cuts on both slopes of the mountain, we will give our readers a particular description of every interesting feature connected with this successful enterprise.

Nevada.

From the Gold Hill *News* July 22d:

The annual report of the Savage Mining Company for the fiscal year ending July 10th, was rendered at the annual meeting of the stockholders at San Francisco, day before yesterday. The report of Superintendent FAIR shows that 39,715 tons of ore was extracted during the fiscal year ending June 30th. Of this quantity, 30,110 tons was from the new mine and the remainder from the old. Most of the ore from the new mine came from the eighth and ninth levels. Of the total amount extracted, 27,211 tons was taken out during the last six months of the year. The amount of ore reduced was 38,147 tons; average yield, $21.43; average cost of production, $11.06; average cost of reduction, $9.95; profit per ton, 42c. The receipts for the year, from bullion and other sources amounted to $864,015. The disbursements for ore extraction, labor, milling, mining supplies, etc., amounted to $845,715. The assets of the company, on the 10th inst., were $48,494, as follows: Stores at mine, assay office and Savage mill, $29,363; furniture of offices in Virginia and San Francisco, $3,500; value of 1,182 tons ore on hand at mine and mills (cost of reduction allowed), $6,064; bills receivable for assaying, $239; cash on hand, $18,300; The company have neither paid a dividend nor levied an assessment during the year. The actual profit for the year is about $8,500. The following are the Trustees elected: R. F. MORROW (President); M. LIVINGSTON, S. STEINHART, A. K. P. HARMON and E. C. MCLANE. T. B. SHAMP was chosen Superintendent and E. B. HOLMES Secretary. Of the expenses, $266,528 was paid for mining labor. President MORGENTHAU remarks, that while pushing economy in every branch, he had no intention to reduce wages, which he thinks low enough. Superintendent FAIR certainly has worked the mine most energetically and economically while in his charge, and leaves it in excellent shape for his successor, Col. SHAMP, who will doubtless pursue fully as efficient a course in its future development. There is plenty of good ore in the mine, but none developed of high grade or in very large bodies. The main hope for profit to stockholders lies altogether in new future developments.

YELLOW JACKET REPORT.

From the annual report of the Yellow Jacket Mining Company for the year ending July 1, 1871, we condense the following items of interest to stockholders: The ore mined and milled during the past year was 59,875 tons, and came principally from the 900 and 1000 foot levels; and there still remain in place, on the same levels, many tons of ore, of similar quality—enough, I am in hopes, at the present rate of extraction, to last until we develope some other body on the new levels we are now engaged in opening. The incline or continuation of the main shaft from a point 30 feet above the 1100-foot level has reached a depth of 30 feet below that level. It is being sunk at an angle of 45 degrees, following the inclination or dip of the ledge, as the bottom of the shaft perpendicularly had penetrated the worst country rock, at the 1100-foot level. The main working drift at the 1100-foot level has reached a point 400 feet north of the shaft. There has been but one cross-cut run on this level, one east of the shaft, at which point we find flattering indications of the existence of an ore body below. By the middle of September, or before, I am in hopes we will have the 1200-foot level opened. The hoisting and pumping machinery is now in first rate order, and capable of working the mine to a greater depth, with very little expense, outside of necessary wear and tear. Secretary G. W. HOPKINS gives the following among his portion of the statistics: Total receipts from bullion, $1,884,323.81. Disbursements for labor, supplies, milling, improvements, salaries, etc., $1,359,575.29. Total expenses for each ton of ore extracted from the mine, $22.65. Profit for the year, $583,441.80. We merely condense the above items for present information. The full report will be published in a few days in pamphlet form.

New Mexico.

From the correspondence of the New Mexican *Weekly* July 25th.

THE SILVER MINES.

Since my last matters have been slowly but steadily advancing towards developing this mining district. With our limited means work must necessarily be slow, but strong hearts backed up by strong arms, will in time overcome obstacles that at first glance seem insuperable. Our attention is just now rivetted upon experiments that are being made in smelting. As I have before said, the natural facilities for this process found within the limits of our district, will make this the best and cheapest process for separating the metal. Fire clay for furnaces, wood for charcoal, galena ore for the flux, and good bituminous coal for coke, are all found here. Probably not another mining district in the country contains within itself so many of the necessaries for its own development. Capital is the only thing wanting, and that must come ere long.

It is not much to be wondered at that our people are slow to believe in the value of our mining resources; the lessons learned in former years having been very dearly bought. But there is such a thing as too great caution, and from the present aspect of matters our own people will wake up to the fact that gradually the valuable mining property of this Territory has passed into the hands of foreign capitalists. English capital is now building a railroad the entire length of our Territory, and already English bondholders are prospecting for investments in advance of the increase in value consequent upon the completion of this and other railroads. Final arrangements have been made with parties from England and the continent to commence work at once at the mines in the lower country, and agreements to the same end are being made for our own. We are hoping to hear the clatter of stamps and to see the smoke of the furnaces ere long. First comers will be the most profitted by these efforts, for as soon as a single substantial demonstration is made of the feasibility of working this ore, just that moment a specific value will be given to property, and so long as custom mills and furnaces will separate the ore, so long can the poor miner hold on to and work his claims, demanding his own price for his property. Never was that crude old saying in which the "early bird" and the "worm" figure conspicuously, so verified as in the present instance in regard to securing property in advance of appreciation. With the completion of the three railroads through our Territory, will come labor, and labor will bring capital. Never before has the future presented such bright hues to those of us who had almost began to fear that we were hoping against fate. Now it is but a question of time, and but a short time, too. Ere five years roll over New Mexico will be unburdening herself of her hoards of gold, silver, copper, lead, and coal, and then the great Yankee nation will look on and wonder that they left Englishmen and Germans to step in and get possession of such vast amounts of wealth, while they have stood looking with doubt and suspicion upon what we have tried so long and so hard to convince them of. To us it makes little difference whether foreign or domestic capital helps us, except that our national pride is mortified to see such opportunities slip through the fingers of our own people simply because of too great caution.

There are at the present time about sixty miners at work here taking out ore from the various silver lodes. The "Sophia Lode," owned by the Spring Hill Mining Company, has a shaft twenty-five feet deep, and has a splendid vein of rich ore. The vein is from four and a half to five feet wide. The "Reinhart lode," owned by Mr. WM. KRONIG and others, is eight feet wide at a depth of sixteen feet and very rich ore. The "Colfax Lode" shows three feet of good ore at ten feet. The "Great Eastern Lode," owned by the Eureka Mining Company shows a splendid vein of rich ore four feet wide. The "Abbey Lode," and a great many others, show good rich ore and plenty of it.

There has been a great drawback on these mines by reason of the miners being compelled to lay idle on account of not having proper tools to work with, and as a general thing they have come here "broke," for who ever heard of a miner going into a new mining camp when he had a cent in his pocket. However, we all expect to be in "circumstances" soon now, as there are several reduction works going up and will be running in a short time.

Utah.

CRUSHING AND SAMPLING WORKS.

From the Salt Lake *Tribune*, of July 22d: The recent erection of two more works for crushing and sampling ores is another evidence of the thrifty growth of the city, and of the mineral-producing qualities of our Territory, as men engaging in this kind of business are generally shrewd enough to first satisfy themselves that mineral exists in sufficient abundance to warrant the necessary outlay, which is by no means small in amount. We recently made a hasty visit to the new establishments situated west of the Old Fort block on the line of the Utah Southern R. R., calling first at the

WORKS OF J. G. JOHNSON & CO.

These gentlemen have located on the corner opposite the southwest corner of the Old Fort block, on a piece of land embracing an area of about 15,000 square feet, and have erected a good, substantial building 50 by 46, surrounded with the necessary platforms, and of easy access by teams or side-track, which will soon be laid alongside their building. The interior we found fitted with a "Brodie's" Improved Crusher, which is a modification of Blake's Patent, and said to be a first-class machine, and also a pair of burrs for finely pulverizing the ore. These machines are driven by a Hoadly 10-horse power portable engine. The building is subdivided into the necessary offices, one of which, the assay department, contained a pair of balances, just imported from London, and weighing to the 2,000th part of a grain, a perfect marvel of fine workmanship. This establishment is without a foreman, being under the personal supervision of the firm themselves, who are gentlemen of unquestioned reliability and business capabilities, and cannot fail to secure a large share of public patronage. On the corner north of the northwest corner of the Old Fort are situated the

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On first entering this establishment we were struck with the small size and novel appearance of the very beautiful stationary engine of 16-horse power, which gives life and motion to the machinery within. Occupying a space not larger than 3 by 6 feet, its power is equal to that claimed for it, and besides a symmetry of appearance it has a finish not excelled by any stationary engine we have examined. On enquiry we learned it was STARKEY'S Patent, and made by WILLIAM TAYLOR & Sons, Columbia Iron Works, Brooklyn, and considered one of the safest and most economical engines in the world, giving unbounded satisfaction wherever introduced. The entire building is about 85 by 30 feet, fitted up in a very complete manner, having for its crusher the well-known Dodge pattern, so long in use in other mining Territories, having a crushing capacity of sixty tons per twenty-four hours. The engine-house containing the engine just described, also encloses the boiler and fine little Niagara steam pump, all of which are fitted with the most recent improvements and appliances, together making the best engine-room in the city. Personal supervision here is also apparent in the many little conveniences for facilitating labor, and we were assured that nothing would

be wanting to make the place worthy the confidence and patronage of the public. A more elaborate description might have been made interesting, but lack of space forbids more extended notice. Success to your enterprise, gentlemen.

HEAVY MINING TRANSACTIONS.

We learn from reliable sources that the mines and furnace belonging to Messrs. BATEMAN and BUEL, in Bingham cañon have been reported on most favorably by CAPTAIN NANCARROW and Mr. HENRY SEWELL. Both these gentlemen are men of great practical experience, having been engaged in mining in South America, Mexico, and Europe. On the strength of their report, made after an exhaustive examination, the property was transferred on Saturday last to the hands of CAPTAIN NANCARROW, as representative of an English company, called the Utah Mining Company. The amount paid for this property is $450,000, coin. This is a large and important transaction for Utah. Our good wishes accompany both of these eminent scientific gentlemen in their career in this Territory. They have triumphantly carried through the first mining operation in Utah on the boards of the London Stock Exchange, and called the attention of English capitalists to our valuable mines. We hope it may not be the last.

NEVADA MILLING ENTERPRISE.

The subscriber, who has had nearly twenty years practical experience in mining and reducing Gold and Silver ores in California and Nevada, desires the cooperation of parties commanding Forty Thousand dollars to erect reduction works in Nye County, Nevada. He exclusively, and for unlimited time, controls the water rights for a circuit of forty miles, which is practically a royalty upon every ton of ore mined within this circuit. The mines of the surrounding districts are well developed, and large amounts of extracted ore, sufficient to keep thrice the proposed capacity of this mill fully employed, await reduction at highly remunerative prices. The property directly included in this enterprise it is believed, will alone yield ore to the full capacity of the mill The ore is readily extracted without blasting, and is of high grade. The mill can be in full operation in four months time and make a net daily profit of Five hundred dollars per day when mining on custom work. This enterprise is confidently presented as the best ever offered in this city for the amount of money required. Critical examination is invited and a liberal interest (which will be of largely increasing value from year to year as the works are enlarged) will be secured to the right party. Strict business and no stock operation is intended and large returns can confidently be relied upon. Principals only dealt with and first-class references given and required.

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1. For paving Willett street, between Rivington and Houston streets, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

2. For paving Nineteenth street, between Second avenue and East River, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

3. For paving Twentieth street, between Sixth and Tenth avenues, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

4. For paving Twenty-second street, between Eleventh avenue and Hudson River, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

5. For paving Thirty-third street, between Lexington avenue and East River, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

6. For paving Seventieth street, between Fourth and Fifth avenues, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

7. For paving Eighty-fourth street, between Third avenue and Avenue A, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

8. For paving Tenth avenue, between Fourteenth and Sixtieth streets, with Belgian pavement, and laying crosswalks at the intersecting streets where required.

9. For paving South Fifth avenue with Guidel improved stone pavement and laying granite crosswalks at the intersecting streets, where required.

10. For sewer in Seventeenth street, between Ninth and Tenth avenues.

11. For sewer in Church street, between Canal and Lispenard streets.

12. For sewers in Avenue D, Thirteenth and Fourteenth streets, and Thirteenth street, between Avenues C and D.

13. For sewer in Fifth avenue, between Thirty-fifth and Thirty-sixth streets.

14. For sewer in Fifty-sixth street, between Sixth and Seventh avenues.

15. For underground drains between Ninety-first and Ninety-third streets, and between Second and Third avenues.

16. For regulating, grading, curb, gutter and flagging Forty-fourth street, between First avenue and East river.

17. For regulating, grading, curb, gutter and flagging One Hundred and Twenty-sixth street, from Second to Eighth avenue.

18. For regulating, grading, curb, gutter, and flagging One Hundred and Forty-seventh street, from Avenue St. Nicholas to Twelfth avenue.

19. For regulating, grading, curb, and gutter Avenue A from Sixty-first street to Eighty-sixth street.

20. For regulating and grading Sixty-seventh street, from Fourth to Fifth avenue.

21. For curb, gutter and flagging Fifty-first street, between Second avenue and East river.

Blank forms of proposals, the specifications and agreements, the proper envelopes in which to enclose the bids, and any further information desired, can be obtained on application to the Contract Clerk at his office.

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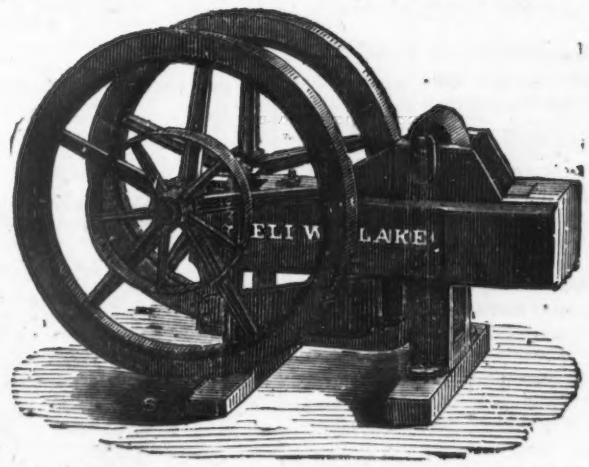

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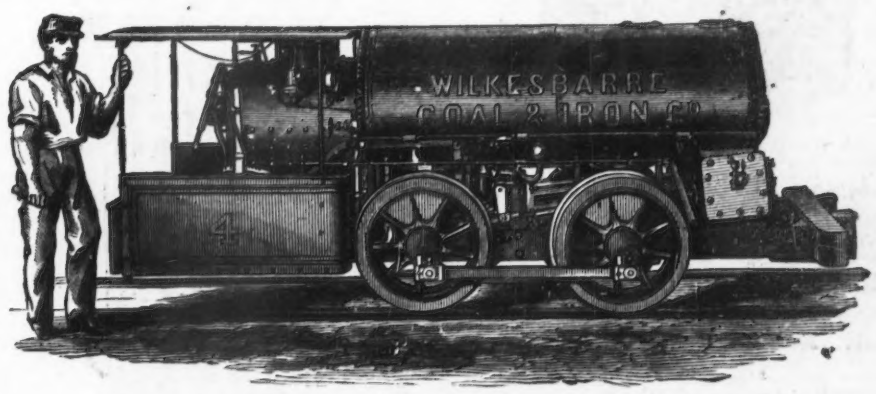

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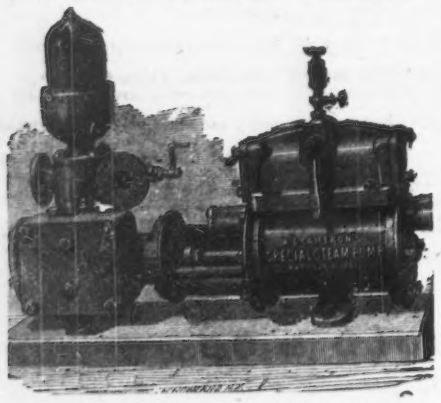

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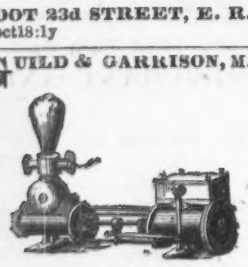

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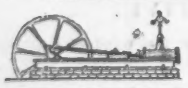

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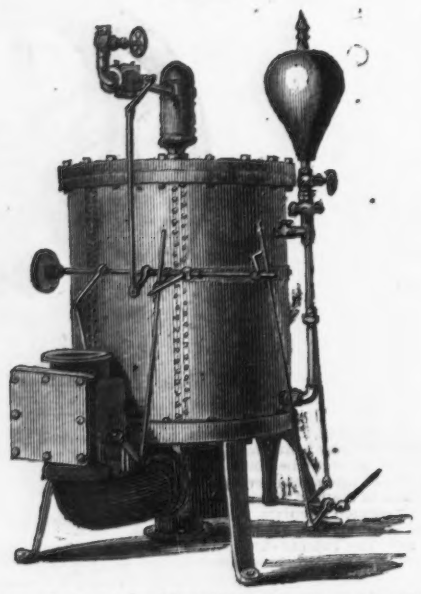

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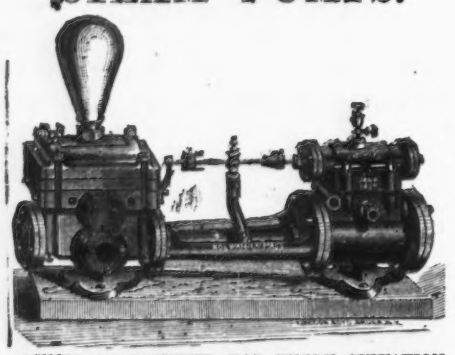

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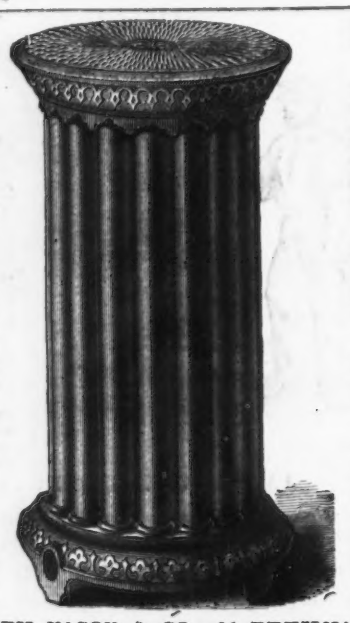

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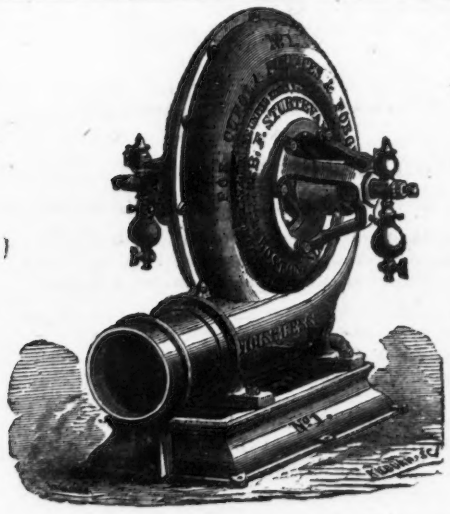

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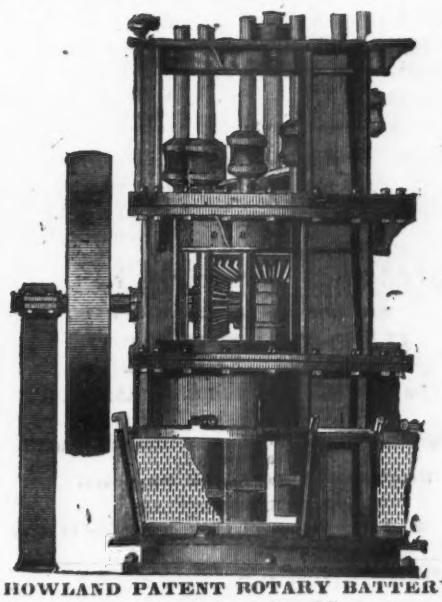

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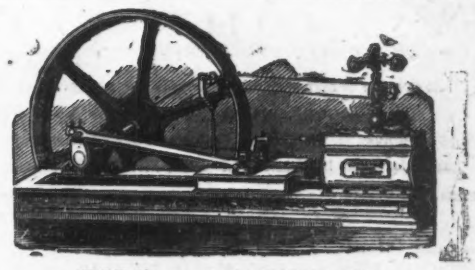

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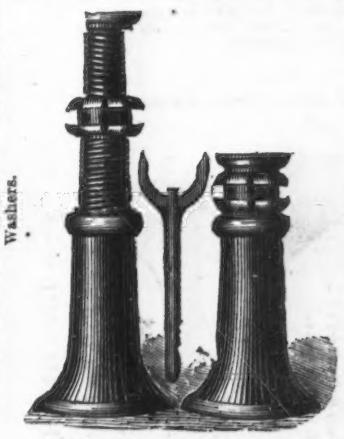

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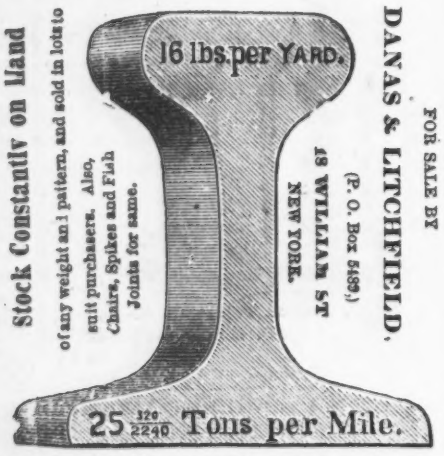

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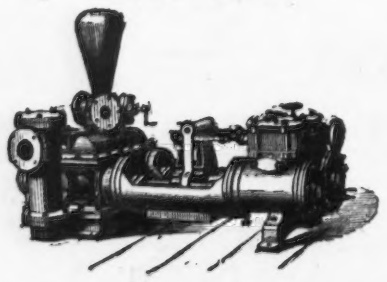

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